
EX
LIBRIS

Protection of Eyesight and National Defense*

Mason H. Bigelow

IN presenting this subject, Mr. Bigelow points out that protection of eyesight is vital to national service, as well as an important economic and social necessity.

THE chief problem before the nation today is national defense. Each of us has a part to play in the program that is developing for a strong and united America; and one of the things that we can do is to help in the campaign for protection of sight.

Although the organized movement for prevention of blindness began more than thirty years ago, the present national emergency gives added emphasis to its importance. The other day, for instance, we learned that defective vision is one of the principal reasons for the rejection of young men who are being examined for military service under the Selective Service Act.

Good eyesight, of course, is an essential requirement for those who wish to train as pilots in the air corps. Modern warfare also calls for large numbers of men to handle anti-aircraft guns; and this branch of the service can use only men with good eyesight.

Good eyes are necessary for skilled craftsmanship in the shop, as well as in the military service or on the high seas. Conserving the vision of American workmen is vital to national defense; for it is essential in the building of armament and the training of men to use defense equipment.

In normal times, the hazards to sight in industrial occupations are serious, and the expansion and speed-up of production resulting from the national defense program increase these hazards. Plans for the employment of large numbers of men in new jobs—working

* Presented over station WQXR, New York City, January 13, 1941.

in strange surroundings, perhaps in plants operating on a twenty-four-hour basis—are bound to add to the number of such accidents. Many of these new employees are untrained, or use operations that are unfamiliar to them. For this reason the Government has already created regional committees of safety experts, throughout the country, who are supervising the accident prevention programs in those plants where national defense materials are manufactured.

There are in the United States today about 8,000 persons who have been blinded by industrial accidents and more than 80,000 persons who have lost the sight of one eye as a result of such accidents. The number of men and women in industry who lose, permanently, part of the vision of one or both eyes runs into tens of thousands each year. Most of such losses and the resulting human suffering could have been averted.

Despite the fact that the amount of blindness has been reduced greatly in the past fifty years, through the development of medical knowledge and surgical skill, eye injuries from accidents of all kinds are as frequent as ever.

Many corporations have given serious attention to accident prevention and have thus brought about notable reductions in all accidents, including eye injuries. Progress has been made in the development of mechanical safeguards; and in some plants, where hazards to sight are prevalent, rules are enforced requiring all workmen to wear safety devices. In industry as a whole, however, the hazard of accidental eye injuries is insufficiently recognized and guarded against.

More money is paid by employers each year as compensation for eye injuries than is paid for injuries to any other part of the body. Recent studies indicate that the financial cost of industrial eye accidents in the United States is more than a hundred million dollars annually. In addition the accumulated social cost of such accidents is incalculable, and the effect on the individual worker in physical and mental suffering is devastating.

Years ago, blindness, as other misfortunes, was generally regarded as an act of God. We know now that—just as we have practically wiped out smallpox, yellow fever, diphtheria, typhoid fever and many other diseases—we can entirely eradicate, or greatly reduce, some of the major causes of blindness. The activities which

are being carried on for the prevention of blindness are directed not only to protecting the eyes of this generation but those of millions of children yet unborn. The educational and legislative drive, conducted during the past twenty-five or thirty years, has brought about a steady reduction in the amount of blindness from ophthalmia neonatorum, commonly known as babies' sore eyes. As a result of the adoption of laws—in nearly all the states—requiring doctors, nurses, or others in attendance to put prophylactic drops in the eyes of babies at birth, and the constant educational activities of the National Society for the Prevention of Blindness, the frequency of "sore eyes" as a cause of blindness among children admitted to schools for the blind has diminished by approximately 75 per cent in the last thirty years.

Progress is being made also in the reduction of blindness caused by syphilis and gonorrhea. It is estimated that more than 25,000 men, women and children in the United States—approximately one-sixth of the entire blind population—lost their sight as the result of these diseases. The situation is improving, however, with the growing success of the nation-wide fight to stamp out syphilis which is being carried on under the able leadership of Dr. Thomas Parran, head of the United States Public Health Service. It is encouraging to report that 20 states have laws requiring premarital Wassermann tests, and 18 states have laws requiring Wassermann tests for all expectant mothers.

Those of us who are associated with the movement for protection and preservation of sight are concerned not only with the problem of preventing blindness, but also with the conservation of vision among persons who have normal sight and the considerable number of persons not blind but with defective vision. You will get some idea of the extent of defective vision when I tell you that approximately 300,000 students in American colleges and universities—or nearly 25 per cent of the entire enrollment—are handicapped in their studies by various degrees of visual defects.

Modern educators are trying to find the boys and girls with seriously defective vision in the early years of school; and we have ways of helping them. Sight-saving classes for such children are maintained in schools throughout the country; and in these classes they receive a full and normal education while their remaining sight

is conserved as much as possible. They are also guided toward the selection of occupations that will not increase their eye difficulties. There are approximately 50,000 school children in the United States with such seriously defective vision as to require special educational facilities, and more than 8,000 of these children are now in sight-saving classes.

Suitable seats and desks are used, and particular care is exercised in regard to the lighting arrangements in the classroom. The books are usually in large type and much of the work is done on the blackboard. Every child is taught the touch system on the typewriter as soon as possible, so that the eyestrain of handwriting may be avoided.

All children are subject to eye accidents in school or at play. Boys and girls of high school age seem to be the most susceptible. They receive injuries in sports, through carelessness with pens or pencils, and in numerous other ways. Sometimes, high school students in physics and chemical laboratories have suffered painful eye injuries in doing experiments without the supervision of an instructor, especially when they have been using unfamiliar chemicals or have been working with inadequate facilities in their own homes.

Through constant educational efforts directed to children and adults, we hope to reduce the large number of eye accidents which are responsible for loss of sight.

In the struggle for protection of eyesight, the National Society for the Prevention of Blindness keeps abreast of all the scientific knowledge in this field. The Society is constantly engaged in public education, to inform the public in laymen's language about these scientific advances and how they may be applied practically in preventing blindness and saving sight.

Good eyesight for all the people of the United States was never so vital as it is today when each one of us is eager to contribute his share toward the national defense program. The nation is exerting every effort to be prepared and the protection of eyesight is now a matter—not only of good economics and humanitarianism—but patriotism as well.

The Problem of Sight Conservation as Related to the General Program of School Organization*

Richard S. French

THE relation of the school to the problem of sight conservation is presented by Dr. French, who enumerates some of the responsibilities which face the school.

IN STATES where the autonomous school district is still the unit of organization and administration, we can speak of a state program in any particular field only in the restricted terms of standards and of such financial aids as may be withheld if said standards are not observed. Thus the state school authorities may say that a teacher shall not teach in special classes without certain minimum preparation in the given field or certain experience in teaching under supervision in that field, or both. Similarly the State may say that it will not share in the payment of excess costs unless a given local district has proper housing and equipment for a special type of school work.

Aside from these very limited forms of control, the central authority of the State in school matters can make itself felt chiefly by way of leadership, by pointing out the desirability of segregations and class organization, of certain types of housing and installation, of specialized equipment and methods. Even so, the real initiative rests still with the local unit and the proper function of the State would seem to be one of encouragement, and of *being there when needed*, rather than any form of direct compulsion, however completely disguised that compulsion may be. It is indicative of the healthiness of our American balance between local autonomy and

* Reprinted, with permission, from the *Journal of Exceptional Children*, November, 1940.

the power of the larger units that, in California at least, the state services are hard put in attempting to keep up with local demands for a more comprehensive guidance and for certain specific aids. In the apparently simple matter of definition, for example, and of standards arrived at scientifically, the central authority cannot as yet meet local needs.

What I have to say about sight conservation will to a great extent be by way of commentary upon the above. With an expanded definition of sight conservation, it can be said in all safety that neither the State of California nor any local community has a comprehensive and integrated program, or has made more than a tentative venture into the field.

Definitions

There is a marked confusion in the public mind as to what sight conservation is. Because of the activity of lighting companies and makers of fixtures, the term has come in certain connections to connote better and more abundant artificial lighting. Similarly the activity of one professional group and of certain manufacturers has led to the popular conclusion that sight conservation is tied up with the sale of optical aids and correctional devices. In another direction the term implies large window spaces and Venetian blinds! School desks of a certain type and make come in for their share of notice. But some of the worst killers of vision and producers of visual disability pass with little notice; the bad print in cheap books, the atrocious multigraphed materials supplied especially in high school classes, the long periods of unrelieved reading, and the overemphasis of the visual element in education. These latter factors may be summarized in the failure of teachers and of educational leaders to take into consideration the fact that from the biological point of view the general process of education from the kindergarten through the graduate schools of our universities is artificial in the extreme and especially artificial in its unbalance of the visual elements. Until the printing press combined with universal education to enslave childhood and youth, sight conservation was only a minor problem concerned chiefly with diseases of the eye, their prevention and cure.

The first element in an adequate definition has to do with vision

itself, that is, with the quality and quantity of vision present at any given time in any given person. The second concerns whether or not the measured vision in the given case at any given time may be bettered or must remain the same or is likely to diminish. Strictly, conservation ought to connote keeping what one has without betterment or loss! However, if betterment is indicated, the question arises as to whether by operation, by medication, by visual aids, by regimen, such as dieting, by alternation of tasks, by environmental changes, such as increased lighting or modification of lighting or change of colors, and so on. If betterment is not indicated, the question arises how best to use what one has, involving the question in turn of the conditions of highest visual efficiency. If diminution or loss appears likely, the problem becomes one of salvage and of adjustment—physical and mental and social.

In all definitions it should be kept clearly in mind that the visual function is a part of a whole process, as the eyes are a part of the body and more especially of a highly complicated and imperfectly integrated nervous system. Poor eyes backed by an alert and finely co-ordinated brain may perform wonders even in such matters as reading, and perfect eyes in an imbecile only lend aid to imbecile acts. It must also be remembered that the eyes will stand more abuse than almost any other organ and operate under a range of conditions that makes their abuse slow in realizing its penalty. Thus we can see objects in an illumination of only 1/200 foot-candle and can still use our eyes effectively at 15,000 foot-candles, a range of 1 to 3,000,000!

Our definition must then consider efficient use under comfortable conditions rather than the lowest possible conditions of effective usage without direct loss. It must also take in the average or superior eye, as well as the defective eye. On this broad basis sight conservation is a term applicable to all children and youths in our schools and to all human beings everywhere.

Standards

When doctors disagree the layman is likely to be confused and in the end to fall back on his prejudices or on that to which he is accustomed. Three major groups have on a more or less voluntary basis attempted to set up standards that apply in sight conserva-

tion and in the effective and comfortable use of the eyes. They are that part of the medical profession that deals with vision as a specialization, the oculists and ophthalmologists; those that under many names approach the study of vision from the point of view of optical physics and whose knowledge of the eye and its bodily connections in anatomy and physiology are necessarily limited by their time of study; and those that in their study of vision make their approach from the point of view of environmental conditioning, particularly the phenomena of light and color. Each group has a large possible contribution and each can, with adequate education, supplement the work of the other two in arriving at a more nearly complete picture of what vision is and does. So far they have largely worked at cross purposes.

Controversy number one involves who may examine the eyes, to what extent and how effectively. Where pathology is involved, the legislation of most states turns the task over to the doctors of medicine. But the lack of physicians properly trained for adequate eye examination and treatment, and also the high cost of such examination, makes imperative the supplementary use of nurse examiners or optometric examiners or both. A second controversy arises from the inexperience of the average physician in matters of lighting and his traditional disregard of environmental factors in his preoccupation with pathology, which makes it necessary to fall back on the lighting expert, especially as regards such matters as mathematical ratios and equations that are usually beyond the physician's ken. The educator should come in as a synthesizer, with his more pragmatic view of tests and standards, and either get all other groups to work together or else get from each its contribution and reach his own conclusions. In any case three sets of standards must be worked out before much progress can be made. These sets are:

I. Standards of examination of eye structure and function in correlation with general health, leading to a determination of such segregation of special classes and assignment to special classes or schools as may be necessary.

II. Standards of environmental conditioning, applying especially to amount, quality, and direction of light, color schemes in rooms and the redirection and modification of artificial and natural light,

the combining of aesthetic effect with proper and adequate lighting, and the supplying of proper materials for visual tasks, such as print above the minimum size and contrast for comfortable and efficient reading for a given age and eye condition.

III. Standards of method and procedure, involving partial postponement of reading in earlier grades and finding of visually less exacting tasks, gradation of tasks according to exactions on vision, and such organization of work in the higher grades and high school as to give rest periods for the eyes, and the supplementing of the more purely visual methods with the use of the radio, *talking books* (for the drama especially), and other non-visual devices.

Agencies

California provides in its Bureau of the Education of the Blind and Bureau of Schoolhouse Planning two sources of standardization and control that can act most effectively only with more adequate *man power* and much more extensive organization and operation. The Bureau of the Education of the Blind, without personnel and without pay, can only speak as a voice from afar and perhaps pay an occasional visit. The Bureau of Schoolhouse Planning carries no mandate in a large proportion of the school building of the state and, of course, touches sight conservation only in the one matter of adequate and proper lighting. The influence of the latter agency has, however, been felt throughout the state in raising standards in both elementary and high school building and has always been on the side of better vision. Both bureaus have largely extended and augmented their programs through publication and through publicity, such as the preparation of this paper.

Locally at least five cities of California have some organization, effective or under way, in the matter of special education and hence either have or have in prospect organization for sight conservation. Two or three counties are following the lead of these cities; but even better is the spirit of interest and willingness pervading the whole school system of the state.

In addition to the more strictly educational forces the public health organizations are vitally interested and active. At least two voluntary organizations have done extensive publicity work North and South, helping to awaken both teacher interest and general

public consciousness. Courses have been fostered in our universities and colleges, both by the National Society for the Prevention of Blindness and by local agencies. These courses have reached a fairly large number and, while too short for adequate training, have at least aroused interest and a desire for more training.

What the Local School May Do

1. All principals and teachers may be conscious of the problems of sight conservation and of effective and comfortable vision under the conditions of classroom, laboratory, library, sewing room, shop, gymnasium, and playground.
2. They may likewise know the general hygiene of the eyes and the requirements of the usual school tasks involving visual effort.
3. They can acquaint themselves with such visual and lighting standards as those set forth by the National Society for the Prevention of Blindness and the Illuminating Engineering Society.
4. They can urge adequate lighting and proper painting in all rooms and usually secure action.
5. They can back a program of eye testing and secure local cooperation.
6. They can develop a consciousness of eye care among their charges, applying not only to the tasks of the school but to automobile driving and home tasks and elsewhere.
7. They can, through reading and by inviting specialists to their meetings, become intelligent and even expert to a degree in matters of visual environment and eye care.
8. They can counteract the propaganda of self-interest and of extremists by taking a sane attitude and a middle course.
9. They can effectively aid sight saving by giving out for class use only comfortably legible materials and by introducing an ever-increasing percentage of nonvisual tasks or tasks involving only the coarser aspects of visual usage. They can also introduce eye-rest periods of two or three minutes in the midst of fine or exacting visual work.

Functional Lighting in the College*

John O. Kraehenbuehl

DR. KRAEHENBUEHL discusses the problem of lighting in college as related to the eye health of students who are compelled to spend night hours in study. The subject of fluorescent lighting, included in this paper, is one of popular interest today.

ASSOCIATED with the consideration of student health is the very important topic of eye health. Because the student is compelled to spend many hours in classrooms, concentrating upon lecture notes, writing boards or quiz papers, and night hours in study under abnormal eye comfort conditions, eye health will always be a division of student health of prime importance.

Approximately 31 per cent of the youth group of college age suffer from near-sightedness and in the productive age group of the faculty (forty to fifty-five years of age), from 70 to 80 per cent have defective vision. (See Figures 1 and 2.) It is apparent that every possible effort should be made to see that the individuals with defective vision have proper adjustments made, and that every effort be made to provide conditions which will reduce eye strain to a minimum.

One of the first recommendations of the illuminating engineer is that the defective vision be corrected to as near normal as is possible under the existing circumstances. The conscientious engineer, when consulted concerning modification of the installation of lighting systems, first warns the client that little which is worth while can be accomplished to relieve those that have defective vision until that condition has been corrected. The illuminating engineer attempts to prescribe a lighting system which will not only prove adequate in quantity of light, but, what is more important, will

* Presented at the meeting of the American Student Health Association, Ann Arbor, Michigan, December 28, 1940. Published simultaneously in the *Proceedings of the American Student Health Association* and the *Journal Lancet.*

have a quality which will produce seeing comfort. It is only because of the efficient and cheap light source which has been developed in the field of electrical engineering that the duty of designing lighting systems and prescribing lighting belongs to this branch of engineering.

The need for an individual who is able to co-ordinate the knowledge of the physician and the engineer is urgent. Progress is being made at this time and it seems that the gap is being filled by a better understanding between the two professions in a common

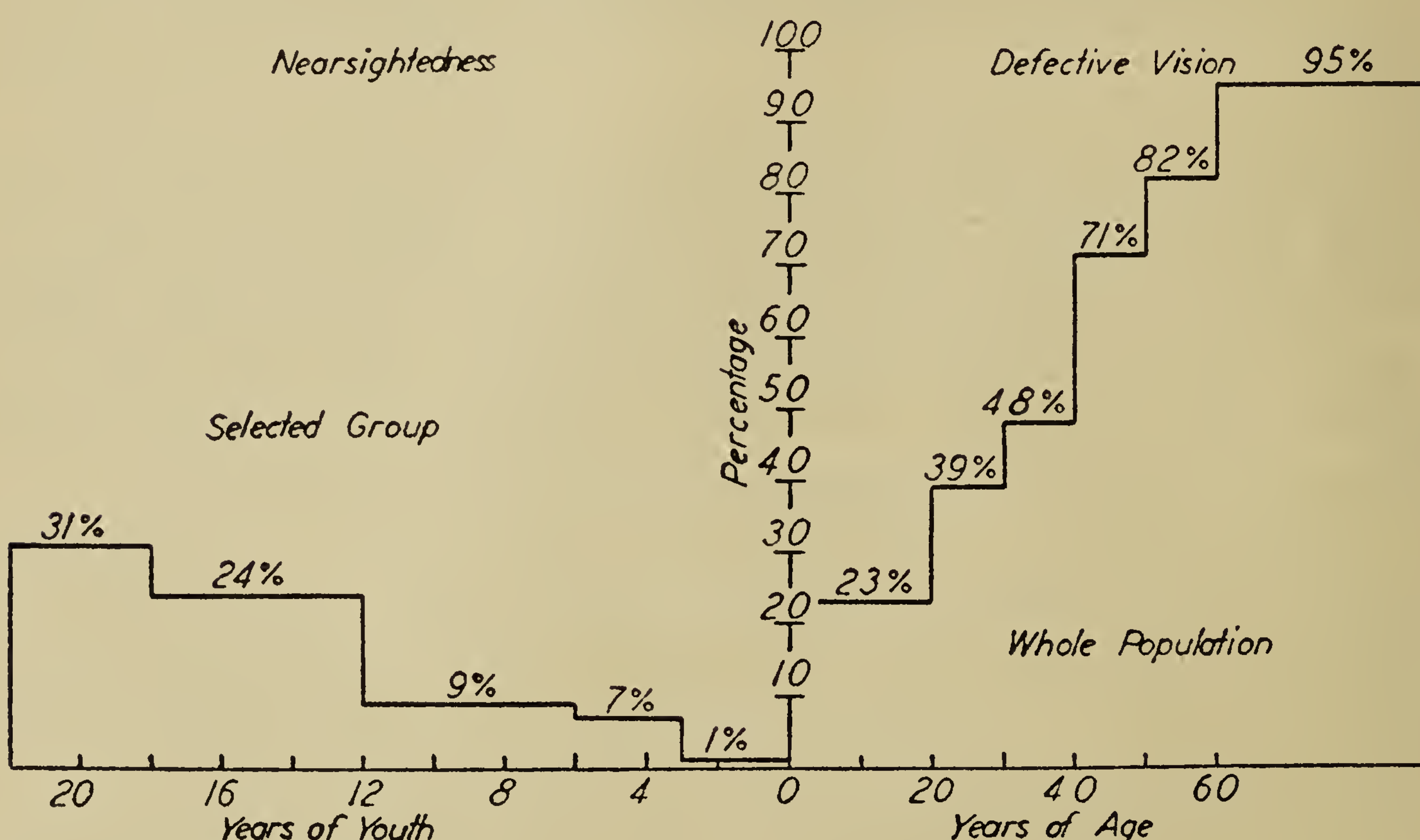


FIG. 1.—Distribution of defective vision with age.

interest and that in the end each will understand the other's vocabularies and function jointly in making recommendations and prescribing lighting. It behooves the illuminating engineer to recommend a testing of the eyes, with accompanying corrections where needed. The physician should insist upon as strain-free seeing conditions as possible so that his prescription shall give the greatest comfort possible.

The lighting of the individual student's study surface has been reduced to practically a package specification, and recommendations are available for school lighting which represent specifications for the minimum desirable conditions for a quantity and quality of

lighting. In the lighting of the school it is impossible to specify a package type of lighting, for there are so many variables which must be considered, as well as the economy of the installation, that it is necessary to study each individual case separately.

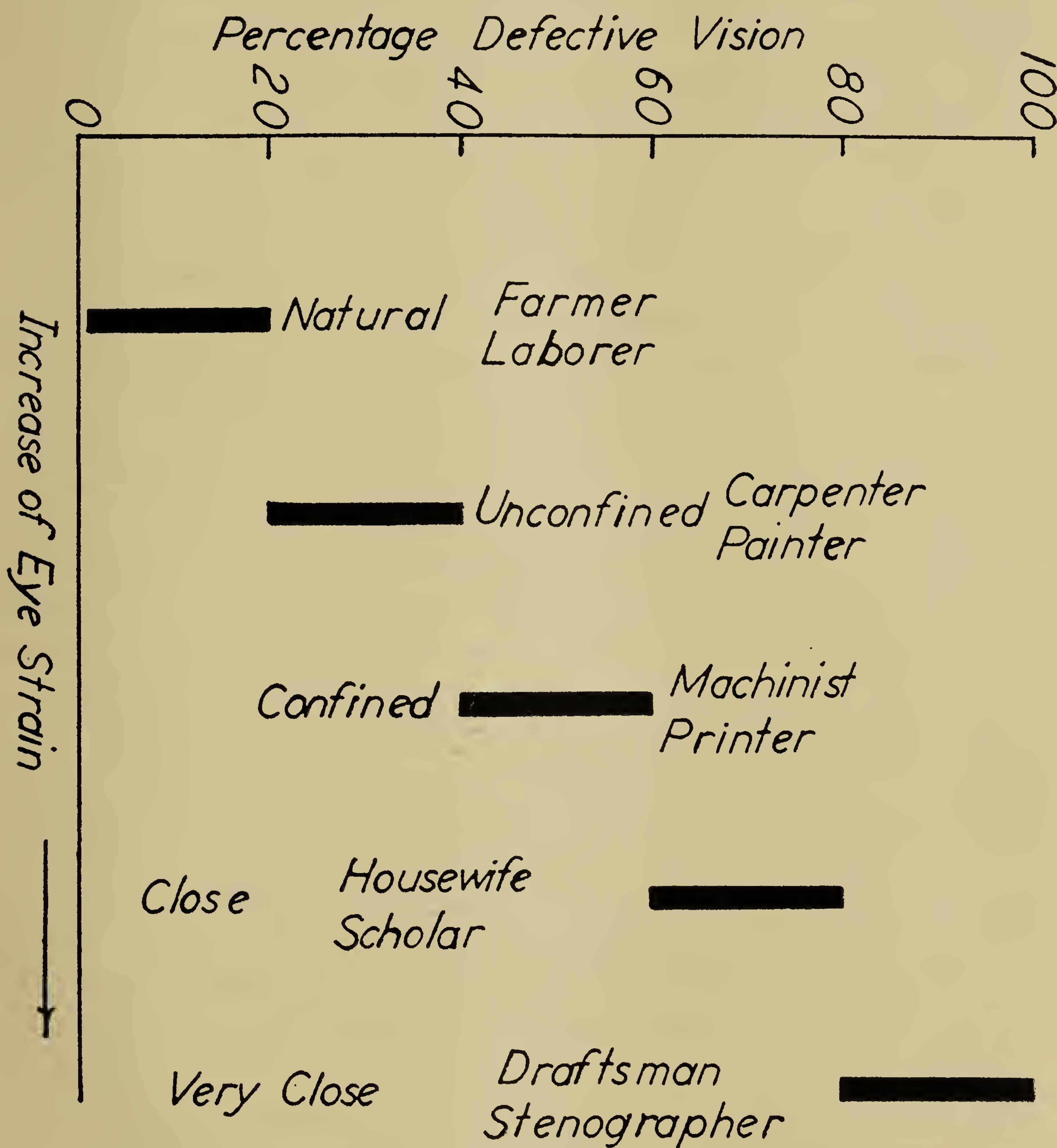


FIG. 2.—Distribution of defective vision with occupation.

Lighting for the College

The *American Recommended Practice of School Lighting*, as sponsored by the Illuminating Engineering Society and approved by

the American Standards Committee,* is the basis for the minimum specifications of school lighting dependent upon the difficulty of the task that must be performed. It is to be understood that this is a minimum specification, not what would be desirable if it were possible to meet the costs of the better installations. Since recommendations for lighting obey a geometrical law, it would be well to double the specifications given if it is desired to obtain a comfortable seeing condition with the attendant lower amount of eyestrain.

The above statement must be considered with an accompanying attention to the conditions of comfort. Unfortunately, so much has been said and written concerning foot-candles that this one unit is often used as the sole basis for a specification. Nothing could be more dangerous. A simple example could be cited by considering an individual reading a newspaper under 10 foot-candles of light. It is possible for the eye to adapt itself to these conditions for a short period of time without serious disturbance. Now, without changing the illumination on the paper, a flashlight beam may be directed into the eyes of the reader with the result that it will be impossible to read the print. The illumination on the paper has remained the same and there has been added to the eye much more illumination, but it has not only been ineffective in producing more comfortable seeing conditions for performing the task, but has actually made it impossible to perform the task. The changing of a lighting system or the specification of a new lighting system must not be undertaken through foot-candle change alone. An increase of foot-candles is desirable if the lighting quality is maintained, but it is meaningless if brightness conditions are such that eyestrain is increased. The term "brightness" must be as fully appreciated as the term "foot-candles" by the interested professions, before worthwhile progress can be made in increasing our foot-candle levels.

Within the range of the eye there must be no sources of excessive brightness nor must there be a brightness contrast of more than ten to one. It would be far better if the ratio were reduced to five to one if possible. Considering these ratios it will be seen that as the general brightness in the room increases the source brightness may also be increased. This fact allows of the specification of the

* *American Recommended Practice of School Lighting,* Illuminating Engineering Society, 51 Madison Avenue, New York City.

brighter fluorescent sources in general lighting as compared to what would be specified with the enclosing glassware using the incandescent lamp. This holds true only where the fluorescent design leads to higher levels of illumination and not where fluorescent installations are used to replace incandescent lamps with the object of saving electrical energy. This new lamp is a tool making it possible to obtain higher levels of illumination with less radiant energy in the form of radiant heat at a wattage specification below that of a corresponding incandescent installation. As will be pointed out later, when dealing with this type of lighting specifically, these gains are not obtained without special financial considerations and without some undesirable features which must be considered upon their merits and not upon the enthusiastic sales arguments of an individual with a catalogue and the fundamental urge of survival in a world of competition for a share of the school administration budget.

Though it has been pointed out before that each problem must be given consideration as an individual lighting task study, the desire of the general public and the school administration group for some yardstick by which to measure, would bring this general recommendation:

Where the classroom is of average size with average ceiling height, and proper coloration (ceiling approximately 75 per cent reflection factor and side walls with a 50 per cent reflection factor as a minimum), six 500-watt lamps properly spaced and controlled with indirect or semi-indirect equipment will give satisfactory lighting for normal classroom work. This work would normally consist of listening to lectures, reciting, making notes, and taking occasional quizzes, with confinement to close work never lasting over periods of an hour. Where the writing boards are used for demonstrations or recitation, there should be special provision for lighting these surfaces.

The above recommendation would not apply to sight-saving classrooms, drafting rooms, sewing rooms, libraries, and other places where the tasks are prolonged and of the type that will produce severe eyestrain if the correct lighting is not installed. The waste of nervous energy through faulty eyesight and poor lighting is probably one of the most important questions for discussion in student health consideration that exists at the present time.

Maintenance

Where lighting is not adequate there are some things that can be done to improve the situation even though it is impossible to install an adequate system. It is understood there is no substitute for the correct lighting system properly installed and maintained, and that

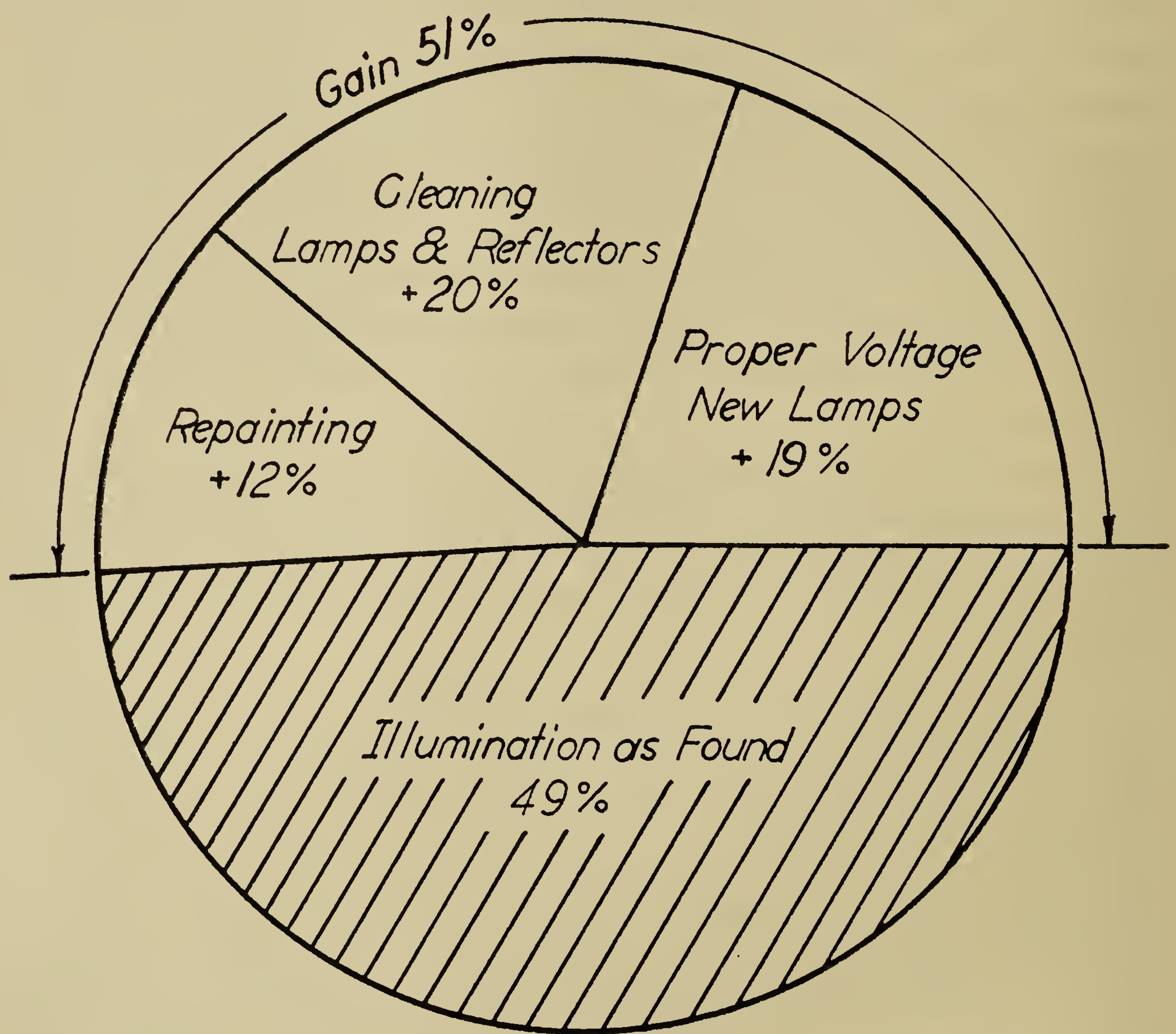


FIG. 3.—Gain in illumination with proper maintenance.

any compromise means merely doing the best that is possible. Though the improvement can not approach the perfect, as it is understood at the present time, there is no reason why any existing system should not be brought up to its highest level of light production. It has been observed that where systems have been improved, giving better lighting, it has always motivated the consideration of the improvement of other localities on the same campus,

and quite often the gain by maintenance has pointed out, in a physical way, the possible advantages of the better standards of lighting.

A net gain of 51 per cent has been shown when repainting, cleaning, and adjusting of lamps and voltage are used for the utmost advantage with the system already installed. (See Figure 3.) Repainting and cleaning should be part of any school maintenance program, and it requires only a judicial adjustment of systematic approach and timing to produce the maximum effect in improving the lighting. It is good economy to burn the proper lamp at the correct socket voltage and there can be some advantage in discarding a lamp before it has operated through its natural life. Though the complete maintenance program has caused an increase of 51 per cent, the result has been to produce more than double the illumination found when the room and lighting system were renovated.

It is frequently found that the wiring capacity is so limited that it is impossible to obtain lamps to operate on the low voltage that exists at the socket, or that the difference in voltage near the source and at the extreme end of the system is so different that a standard lamp placed at these positions would in one instance be over-voltaged while at the other it would be operating at an under-voltage. There is little that can be done for a system of this type except to study the wiring and make such improvements as are necessary.

There are now available smaller wires of higher capacity which may replace the existing wires, allowing a cheaper method of rejuvenating the obsolete system. Another argument being advanced is that the incandescent system may be replaced with fluorescent lamps. For comparable installation, about twice the lumens per watt may be obtained from these newer type lamps; however, where there is a marked deficiency in a wiring system, an improved lighting system, justified in bearing that name, would likewise require additional wiring. Where this is true, the choice of system will again depend upon an economical study of the various systems considered and the consideration of the heat produced by the system; this is particularly true where air conditioning is under consideration.

Lighting for the Critical Task

Roughly, the lighting in the college divides itself into two main types of lighting for seeing tasks. The general lighting has been discussed in a previous paragraph—the next problem to consider is the one for critical seeing. In the drafting room and the sewing room, for instance, a very severe task must be performed and the task is prolonged, for laboratory sections of this type are usually scheduled for three-hour periods. In the library, and at the study surface in the individual rooms, the student may spend hours in close concentration upon poor printing, small type, and his own hurriedly taken notes in the classroom. Each of these tasks will produce, at best, a severe strain upon normal eyes and upon those which have been corrected as close to normal as possible. There should never be a compromise at these work positions; every effort should be made to make them as close to ideal as is economically and technically possible. Except for the student's study desk, there can be no general recommendations given as to what the final installation should be, for each specific case is a study in itself and should be considered by some experienced individual who has in mind both the functional requirements and the special means that are used in accomplishing the results that investigation and practice have shown are satisfactory.

For the student's study surface, there has been developed what may be classed as a package recommendation. It represents the results of studies made by a committee of the Illuminating Engineering Society. The result of this committee's investigations led to the designing of an equipment known under the class specification of the I. E. S. study lamp. This lamp, with the proper bulbs, will provide adequate lighting for study for one individual when it is placed on a table where it can be located to remove the reflected glare in a room of normal student dormitory size. If possible, there should be no compromise on an individual lamp for each student, because of placement and freedom upon the work surface for locating books and writing materials. There have been some suggested arrangements* where it was impossible to finance the requirements for individual lamps for each student, but it must be remembered

* Phelan, Anette M.: "The College Student and Dormitory Study Facilities," the SIGHT-SAVING REVIEW, Vol. IX, No. 1, March, 1939.

that this is a compromise and it was not the intent of the committee making the recommendations that more than one individual should use the lamp. This lamp is not a perfect device, but represents the best that can be obtained within a reasonable cost for the study lamp and its operation. The following is a suggested recommendation which seems to be as satisfactory as can be obtained in a progressive school considering lighting needs of students, which at the same time represents requirements within the economical limits normally presented at the average college:

> The window area, properly shaded, should be at least one-fifth of the floor area. Provisions for study lighting should not depend upon the general room lighting system unless it is of a totally indirect type. Each study position should be properly lighted with an approved lamp requiring a 100-watt incandescent lamp. The quality of work-surface illumination should average between 15 and 25 foot-candles of controlled light, free from both direct and reflected glare. Direct glare is eliminated by properly screening the source; reflected glare, by providing work surfaces with a dull finish. Harsh shadows should not appear on the work surfaces and the illumination should be uniform (10 foot-candles two feet from the lamp center line).
>
> The room surface viewed should have 20 per cent of the work surface illumination, with the reflection factors for the ceiling and sidewalls at 75 and 50 per cent, respectively. The work surface should be at least 30 inches by 42 inches if a desk lamp is used, for it is necessary to locate the lamp properly to remove the reflected glare. For surfaces smaller than this, a floor lamp with filament not less than 60 inches above the floor level should be used in place of a desk lamp. Study lighting equipment should conform to the specifications of the Illuminating Engineering Society (I. E. S.) and should have the required certificate of approval attached when it is purchased.

When making a study of the drafting room, sewing room and library lighting, besides meeting the requirements for a high level of illumination (well-controlled lighting of from 30 to 50 foot-candles), specific attention must be paid to the quality of that lighting. The ideal is a totally indirect system, regardless of the type of light source that is used. Such a system will be free from:

1. Direct glare, if care has been taken in distributing the light over the ceiling surface so as not to produce high brightness contrast or high ceiling brightness.

2. Reflected glare, which will follow the same consideration as direct glare. Reflected glare will never exceed in brightness the initial specular source which produces it.
3. Shadows, which are confusing and cause strain both from brightness contrast and multiple attention points causing confusion in the eye focusing.
4. Non-uniform lighting—the desirability of uniform lighting for a work surface is self-evident but it does not conflict with the atmosphere of interest the architect wishes to create.
5. Differences of brightness between the work and the surroundings. The brightness contrast, as mentioned, should never exceed a ratio of ten to one.
6. Highly polished work surfaces, such as glass tops and varnished desk tops. The tendency is to use dark desk tops and this should be discouraged, for a top with a reflection factor of 20 or 25 per cent will prove more satisfactory, and work on a 30 per cent reflection surface at an illumination of 50 foot-candles is even more satisfactory. It is necessary to reduce the brightness contrast between the book and the surroundings to the limitations set above.

In making recommendations, it must be remembered that a large, low brightness surface may be a source of irritation in itself by producing a glare effect when the student is exposed to the surface for a long period of time.

Fluorescent Lighting

In the preparation of this paper, the author has been asked to consider the latest arrival in the group of light sources—the fluorescent lamp. Much publicity has been given this light source and in many instances this type of lighting is being recommended by individuals with only the most meager knowledge concerning the merits of the equipment in producing a lighting system for comfortable seeing. Often where the adviser recommends such a lighting system he is truthful concerning the statements made and the system when installed and properly maintained will be correct, but he fails to point out the relative cost as compared to the incandescent system, and fails to call attention to the fact that the fluorescent lamp is not as simple and dependable as the incandescent lamp. In producing the fluorescent lamp it is impossible to

obtain the uniformity of quality in color, light production, and life, as in the production of the incandescent lamp.

Where the problem is one of producing a specific color temperature, such as daylight, or the replacement of the old form of tubular light sources, there is little doubt but that with all its inadequacies and some uncertainties, the fluorescent lamp is the correct solution. In the future, in our laboratories, where color is important, and in art classes, it can be expected that daylight or lamps of other color temperatures, or color, will be recommended. Because of the cheapness with which these lamps produce colored light as compared with other methods, the added inconvenience need not be given serious consideration. The result justifies the extra expenditure for auxiliary equipment and the special operating and maintenance problems which the fluorescent source introduces.

The specification of fluorescent lighting for general illumination in the libraries and classrooms of the college, and, as has sometimes been recommended, for the dormitories, should be given detailed consideration with a complete study of the economics involved. Today the installations of this type are much more justified than they were a year ago; in fact, it has been shown by reliable lamp manufacturers that from March, 1939, to March, 1940, a basic unit of fluorescent lighting when installed has been reduced in cost from $6.71 to $3.77, which is a reduction of 44 per cent, based on the 1939 standard. The word "unit" includes the complete cost of lamp, auxiliaries, and equipment, with due consideration of the time interval of burning during lamp life.

In the following statements it may be that some will conclude that the author is opposed to the installation of fluorescent lighting in the college, but this is not the case. The author has in several instances recommended this type of lighting in colleges, but only where the conditions justified the recommendation, and it was pointed out to the client that the economical justification would be accompanied with several other difficulties which are not present in an incandescent lighting system. As the lamp is developed and perfection is approached, as the cost of the lamp and auxiliary is reduced, there will be more reason for making recommendations for installations of fluorescent lighting to meet general lighting needs. Where a school is considering air-conditioning in particular, to meet

the heat problem during summer school periods, it is recommended that considerable attention be given the fluorescent lamp.

The desire of the illuminating engineer is for more illumination, and since a good portion of the energy which is delivered at the light source produces heat, his intentions are antagonistic to those of the ventilating engineer, who wishes to exclude all possible foreign heat. In rooms to be air-conditioned it is necessary to have the co-operation of the groups interested if the lighting requirements are not to suffer.

There are two general rules that seem to prove true in most cases: it is not satisfactory to replace incandescent lighting by equipment which will give the existing foot-candles; and it is seldom possible to replace incandescent lamps, watt for watt, with fluorescent lamps and obtain the lighting benefits which the new source makes possible. Therefore, since a good installation of fluorescent light should in the usual case require some rewiring, it is well, in making the study for recommendations in lighting improvement, to balance the cost of this type of lighting against the cost of an incandescent system.

Since the usual sales approach for fluorescent lighting is that more light is obtained from the same wattage, and this is true, the following questions are raised: "Does this mean more lighting for the dollars invested, and does it mean a system which will be satisfactory from the operation and maintenance standpoint?"

To answer this question it is necessary to consider somewhat unrelated factors, which are listed below:

1. Is Daylight Quality of Light Necessary?—Reports on the effect of color in light when considering daylight color temperature or even monochromatic light, have shown that there is no appreciable effect on the subject, regardless of the color of the light within the limits of illumination levels normally recommended for interior lighting. There are some psychological effects caused by the monochromatic lights of various colors, but there seems to be a rapid adaptation by the individual to the colored light if there are no other light sources which can be used for comparison.

2. Are There Factors Which Might Discount the Reports of Unusual Gains in Foot-Candles?—Where a reported installation shows a gain in illumination of more than double after replacement of an

incandescent system by fluorescent lighting, there are grounds for questions. If, at the time of making the new installation, the wattage has been increased, the room has been reconditioned, and the lamps adjusted to the voltage, the gains through these changes cannot be credited as an advantage of the new light source.

During the first 100 hours of burning of the fluorescent lamp there is an increase in the lumen output of the lamp which does not represent the actual average conditions that exist during the life of the lamp. Any reported improvement should be on measurements made after the lamp has been in operation at least a minimum of 100 hours.

The type of foot-candle meter used may be of importance. The use of the barrier-layer cell in making light measurements will introduce an error in the report of true illumination gain, for this instrument is calibrated under a specific color temperature and some of the fluorescent lamps have different color temperatures or are off the black-body curve completely, which may cause the meter to read high unless it has a correction filter adjusting the meter reading to the true eye response curve.

3. Is the Fluorescent Source of Low Brightness?—Compared with the incandescent lamps of 300 and 500 watts, which are usually used for general lighting in colleges, the fluorescent lamp is of relatively low brightness. However, comparing the brightness of the fluorescent lamp with that of the desirable brightness of the lighting equipment used in classrooms is another matter, for in this instance the fluorescent lamp is much the brighter. It is not desirable to install a lighting system using fluorescent lamps in the classroom where the eye is exposed to either the direct or the reflected glare from the lamp. The source brightness of the fluorescent lamp exceeds that recommended in the *American Recommended Practice of School Lighting*, which was established for the minimum foot-candles listed in these recommendations. The information which is available indicates that if the illumination is increased the source brightness may be increased, and a study of these principles may bring recommendations giving a foot-candle brightness specification instead of a fixed brightness value. However, it would be well to follow the recommendations for brightness values in schools until such a time as the Illuminating Engineering Society, through

its committee, recommends otherwise. This brightness limitation does not preclude the use of fluorescent lamps but does limit the type of equipment which may be installed and definitely excludes the placing of bare fluorescent lamps in any room which is being used for class or laboratory purposes.

4. Is the Fluorescent Installation More Complicated Than an Incandescent Lamp Installation?—There are current flow limiting devices, power factor correction principles, automatic switching and proper starting compensation provisions made in the fluorescent system, while the incandescent system is entirely free from any of the above mentioned auxiliary equipment. (See Figure 4.) The whole fluorescent arrangement is a balanced system depending on adjusted parts, and is more sensitive to voltage regulation and temperature for perfect operation. In the incandescent system, improper voltage regulation means uneconomical and inefficient operation but does not preclude operation, while with the fluorescent lamp these same conditions not only cause the same effect on economy of operation, but may cause deterioration of the system and even preclude operation when carried to certain probable occurring limits.

5. Is There a Hum?—There will be a hum from the auxiliaries because, to date, the electrical engineer has not been able to design a ballast composed of iron and copper which will not hum. Is the hum objectionable? The answer to this question depends upon the reaction of the individual. If the units are built by a reliable manufacturer and are properly cushioned, it may be said, in general, that the level of hum is so low that the average individual will accept it as a background noise and will not be conscious of its presence.

If it is necessary to remove this hum completely, it is possible to locate the ballasts outside of the room or at some central location, in sound-proof cabinets. This item must be considered in a design, for the location of the auxiliary equipment at points removed from the lamps requires more wire and a cabinet, both of which will increase the cost.

Where the teacher might be an individual irritated by the hum, there is a possibility of having the advantage of the lighting system nullified. If the teacher is irritated by the hum, it is natural that the cause would be removed by turning out the lights, which de-

feats the whole purpose of the lighting design. Regardless of how well a classroom is designed, there is a need on the brightest day for

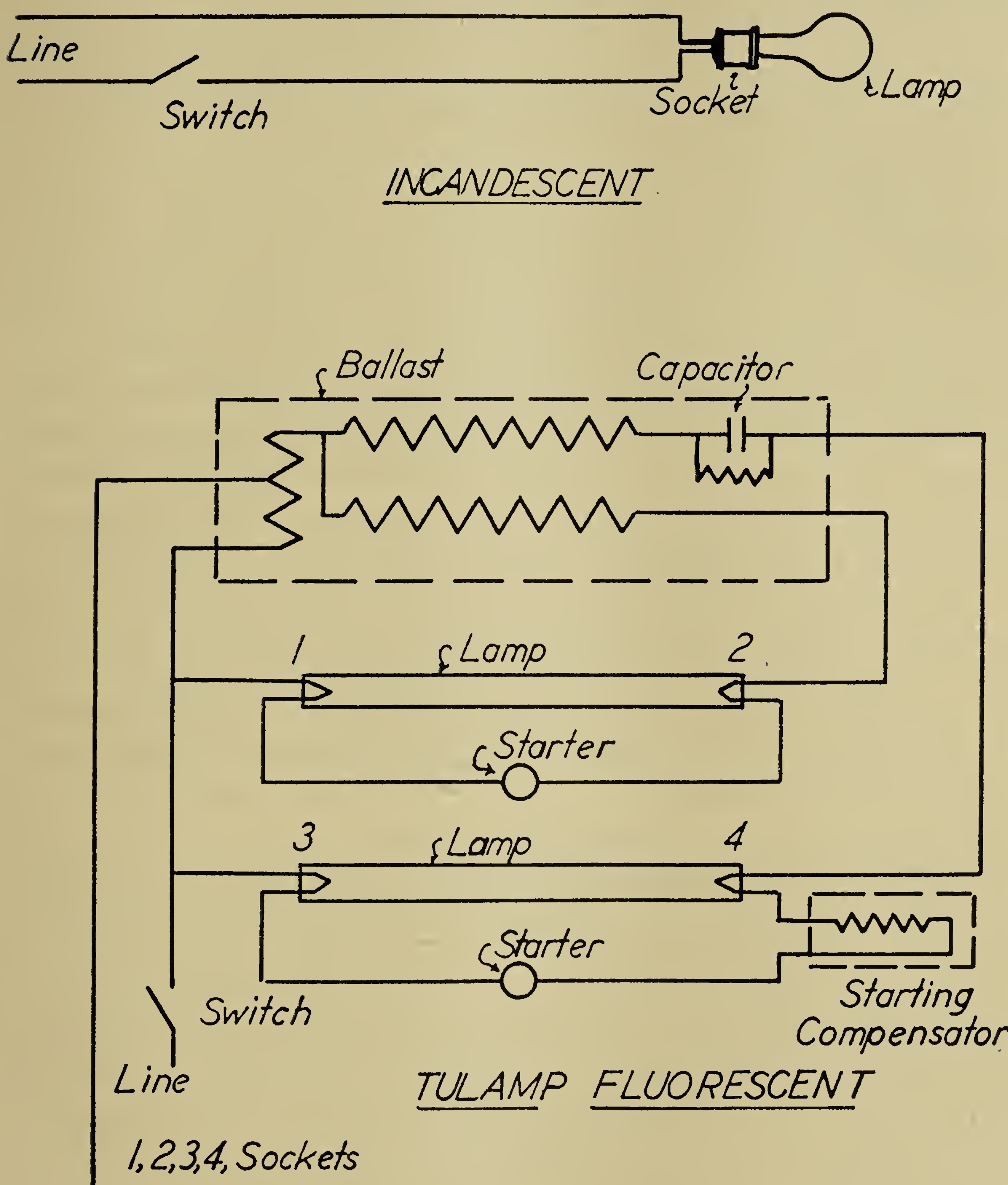


FIG. 4.—Comparing the incandescent and tulamp fluorescent lamp with reference to the complicacy of the auxiliary equipment.

artificial lighting at the inner row of seats farthest removed from the windows, and on a dull day it will be necessary to light the room completely with artificial lighting.

6. Is There a Different Maintenance Problem for Fluorescent Lamps?—The problem of care of the system is quite different. The incandescent lamp either functions or does not function, and even if the lamp does not burn, no damage is done by having the switch at the *on* position. The incandescent lamp lights immediately without a delay period and burns at what seems to the eye to be a uniform brightness.

The same is not true for the fluorescent lamp. It does not start immediately when the switch is placed in the *on* position. There is a period of preparation which the lamp passes through, and during this relatively short period there may be some flicker. If the lamp or its auxiliaries do not operate correctly, there is a likelihood of damage to the lamp or the auxiliaries, and the failure to function with the switch in the *on* position may cause an expensive renewal unless the lamp is either cut off or immediately serviced. The first defeats the purpose for which the lighting system was installed, and the latter is very difficult to obtain in the college or university.

There is another effect in which the gas in the lamps seems to be swirling. Though the lamp is operating at normal brightness, the effect is the same as a flicker to the eye and will cause enough irritation to make it necessary to turn off the lights. It has been found that, because of habit, some individuals accustomed to the quick action of the incandescent lamp, are extremely annoyed by the initial flicker when the lamps are starting.

7. What of Stroboscopic Effect?—The first lamps were operated as single units from single phase electric lines. Since the gas conduction causing the glow in the tube follows the change in current which passes twice through zero in a cycle, there is a definite extinguishing of the lamp. The same occurs in the incandescent lamp, but there is enough delay in the cooling of the filament that the eye carries over. The rapid and positive breaking of the continuity of light makes it possible to obtain several separate and distinct images of any moving object. This multiple image formation is very objectionable to one inclined to be even slightly nervous. Because of the early lamps, the fluorescent lamp still carries the stigma of a first development. It is the practice today to install what is known as a *tulamp* unit, using two fluorescent lamps correctly connected so that the resultant effect is no more severe than

that found with the incandescent. There are also many single lamp installations that are giving very satisfactory service. To make sure that there will be no unnecessary objection to the system, it is well to forestall stroboscopic effects by using the latest lamp and auxiliary arrangements.

8. Will the Fluorescent Lamp Give More Light for the Same Wattage?—The fluorescent lamp will give more lumens per watt than will the incandescent lamp, but not as much as is frequently credited to the lamp. It is fair and correct, when calculating the lumen output per watt for the lamp, to include with the lamp wattage the wattage of the auxiliary equipment.

For general incandescent lighting the 300-watt and the 500-watt lamps represent the normal capacity that should be installed in designing proper school lighting. The table below compares the incandescent and fluorescent lamps:

Incandescent		
300-w	5,900 lumens	19.7 lumens per watt
500-w	10,000 lumens	20.0 lumens per watt
White Fluorescent (Tulamp, 115 volts, including auxiliary loss)		
40-w	2,100 lumens	36.5 lumens per watt
Daylight Fluorescent (Tulamp, 115 volts, including auxiliary loss)		
40-w	1,800 lumens	31.4 lumens per watt

The values given are from recent publications, but as the lamp is being improved there is an increase of efficiency. To replace the 500-watt lamp will take approximately five white fluorescent lamps, which, with the auxiliaries, represent about 243 watts, or approximately half the wattage accompanied by a doubling of the lumens per watt. This gain is very much reduced on a dollar base when comparing the initial installation costs. It is this gain of light with less wattage which makes it mandatory that fluorescent systems be given consideration when designing or remodelling lighting for schools.

By installing a 230-volt system it would be possible to increase the capacity of the lighting system and improve the efficiency of the fluorescent system a few per cent more. In making any study of this new light source all computations should be made on the

latest published data, for the development of these sources is progressing so rapidly that data become obsolete very rapidly.

The most recent lamp size added to this group is the 100-watt lamp, which has approximately the same lumens per watt output as the 40-watt lamp, but the total output is such that the number of lamps needed is reduced and the fixture costs will be reduced because fewer will be needed.

It is essential that the one specifying or requesting this new form of light source be informed about the above features when considering the lighting system. It is not logical to know only a portion of the story and try to draw conclusions from this limited information. The well-designed fluorescent lamp system can give the same quality of lighting as can the well-designed incandescent system. The fluorescent lamp has the advantage of giving considerably more light for the same wattage, with some very undesirable operating conditions. In making a choice, all the factors involved must be evaluated, and this is difficult because part of the problem deals with subjective factors rather than with the objective ones which may be definitely evaluated. Experience with some of the installations now in service and being installed will permit of a more accurate evaluation of the subjective factors.

It may be of interest to consider the use of auxiliary fluorescent lamps in a library. (See Figure 5.) The general illumination is approximately 20 per cent of the table illumination. One room uses a well-controlled direct system of general lighting, the other a semi-indirect system. Both of these installations have the approval of the library staff and the students. At best, this type of lighting is a makeshift because it was necessary to increase the work surface illumination and it was impossible to supply adequate general lighting of the correct quality. A table type of library lighting should never be installed in planning a new building. Correct library lighting is a comfortable system of general lighting which will give adequate illumination.

Summary

The question of eye health in the college is so closely linked with the lighting of the task which must be performed that it is impossible to separate the two. The professions interested in the correct

(*a*) In conjunction with direct lighting

(*b*) In conjunction with semi-indirect lighting

FIG. 5.—Table Type Fluorescent Lamps for Library Service.

solution of the lighting requirements are perforce of very different training and point of view. To obtain data to determine the satisfactory type of lighting and amount of illumination will require the co-operation of both the medical and engineering professions. This co-operation must be built upon the mutual respect of each profession for the ability of the other, and a maturing of each profession in the requirements which must and can be met in specifying a lighting installation. When this has been accomplished and both professions place their proven claims before the college administration, the group responsible for the operation and policy of the college will have to give more attention to the sadly neglected problem of providing adequate and correct functional lighting where study and laboratory work is the daily and nightly task.

There is another group of individuals—architects—who must be considered and who may prove a major hindrance if their problems are not considered and their co-operation sought. This group is trained in producing the desirable atmosphere with the materials at hand and this is often a very difficult task when funds are limited. It will be found that proper sympathy with the solutions of their problem will permit of a fitting of a lighting design into the atmosphere sought by the architect without either group having to make more than minor adjustments in their original ideas.

It is essential that these professions agree upon methods of procedure and upon what will be a pleasant and satisfactory lighting system, and if they will co-operate in educating the student to demand good lighting and in educating the administration to the necessity for good lighting, there will soon be considerable impetus to a movement which has slowly been gaining momentum and which has grown under a slogan which combines better sight with better lighting.

Facts and Factors in the Prevention of Blindness Program*

C. Edith Kerby

WHAT is blindness; how prevalent is it; how much defective vision is there; what are the larger aspects of conservation of vision; and whose responsibility is it to prevent blindness and conserve sight? These are some of the questions answered by Miss Kerby.

THE problems of welfare work with the blind and the work for prevention of blindness and sight conservation differ in so many respects that it is usually desirable for the two programs to be organized separately and carried on with their own highly specialized personnel. For example, the blind and the partially-seeing require special but quite different educational methods. The chief distinction between the two groups is that the blind, who are presumed to have little or no useful vision, must rely on other senses, usually the tactual sense, in acquiring knowledge and skills; while the partially-seeing, whose chief need is conservation of vision, use visual methods but require special materials and environment to compensate for their handicap.

Definitions of Blindness and Seriously Defective Vision

Definitions of blindness vary somewhat in different states and sometimes even within a state administering programs for the blind under more than one agency. However, the one in most general use for purposes of compensation and financial assistance is "economic blindness." This defines a blind person as one who, with eyeglass correction, has central visual acuity of 20/200 or less in the better eye, or one who has better than 20/200 central vision but an equivalent handicap due to limitation of peripheral vision (usually

* Excerpted, with permission, from the article on "Blindness and Conservation of Sight," written jointly with Evelyn C. McKay, and published in the *Social Work Year Book, 1941.*

to a diameter of 20° or less). This means that the person on the borderline of blindness can just recognize at a given distance detail which a person with normal vision can see at ten times that distance. While he might read capital letters in approximately 18-point type, he would experience as much difficulty as the person with normal vision would in reading 2-point type. If the defect is in peripheral vision, his entire field of vision in the better eye would be less than the size of an ordinary book page at reading distance, and not much larger than the height of a tall man at a distance of 20 feet.

The partially-seeing group includes those having corrected visual acuity between 20/200 and 20/70, as well as those with less marked defects whose vision may grow progressively worse.

Prevalence and Causes of Blindness and Defective Vision

State-wide surveys and statistics showing the number of persons on blind assistance rolls give a better basis for estimating the number of blind persons than existing census data. The best estimates available place the figure for the number of blind as defined above in the United States somewhere between 200,000 and 250,000, or approximately 1.5 to 2.0 per 1,000 of the general population. The number of partially-seeing is probably higher. It has been found to be about 2 per 1,000 in the school-age group.

Moderate or slight degrees of deviation from normal vision are quite common in the population at all ages and all economic levels. Estimates of their prevalence by type and by degree are impractical because experts find it difficult to define a "defect," inasmuch as the need for correction depends so largely upon the individual's tolerance of his defect.

A series of studies of causes of blindness inaugurated by the Committee on Statistics of the Blind* in 1933 is supplying more

* The Committee on Statistics of the Blind, jointly sponsored by the American Foundation for the Blind and the National Society for the Prevention of Blindness, was appointed in 1929 to study the problems of statistics of blindness and the blind and make recommendations for the improvement of such statistical data. Its membership consists of: Dr. Ralph G. Hurlin, Russell Sage Foundation, Chairman; Dr. Conrad Berens, New York Eye and Ear Infirmary; Dr. Lewis H. Carris and Miss C. Edith Kerby, National Society for the Prevention of Blindness; Mr. Robert B. Irwin and Miss Evelyn C. McKay, American Foundation for the Blind; Mr. Bennet Mead, formerly of the U. S. Bureau of Census; Dr. B. Franklin Royer; Mr. Stetson K. Ryan, Connecticut Board of Education of the Blind. Office of the Secretary, 15 West 16th Street, New York, N. Y.

adequate statistics than had previously been available. These studies, which follow the Standard Classification of Causes of Blindness developed by the Committee, provide similar data for all groups studied, making possible comparisons and combinations of the figures. They also fill the need for information regarding the underlying causes of blindness, so necessary in formulating prevention programs.

Cause-of-blindness data in which the etiological factors have been cross-classified with the type and site of eye affections are available at present for more than two-thirds of the blind of school age* and for groups of adult recipients of blind assistance in several states.† While these samples are not representative of the entire blind population, they indicate the major problems in prevention of blindness. The most important findings to date are the following:

1. The need for intensive research into etiological factors, shown in the lack of such information on records of blind persons examined long after blindness occurred and of those whose blindness was caused by eye conditions, such as cataract and glaucoma, the etiologies of which are unknown. Among children, cases which fall in the "unknown" categories are the 36 per cent of "prenatal origin, cause not specified"; the 10 per cent classified as "undetermined by physician"; and 3 per cent "unknown to science"—a total of 49 per cent in all. Among adult recipients of aid to the blind, the corresponding figures are, approximately, 8 per cent of "prenatal origin, cause not specified"; 16 per cent "undetermined by physician"; and 30 per cent "unknown to science"—a total of 54 per cent.
2. The fact that one-fourth of blindness (24 per cent in children and 23 per cent in adults) is caused by "infectious diseases." The true figure may be considerably higher. In the order of their numerical importance the communicable diseases most likely to cause blindness are syphilis, ophthalmia neonatorum (babies' sore eyes), trachoma, meningitis, and gonorrheal eye infections.
3. Accidents, both occupational and non-occupational, are the cause of 9 per cent of blindness in children and 13 per cent

* See Committee on Statistics of the Blind, *infra cit.*

† The Social Security Board has adopted the Standard Classification of Causes of Blindness for use by agencies administering aid to the blind programs. See *Social Security Board, Instructions to State Agencies Participating in the Study of Causes of Blindness Among Recipients of Aid to the Blind* (*infra cit.*).

in adults. (The percentage for adults is undoubtedly higher, since those receiving compensation for occupational injuries are not included.)

4. Heredity is responsible for a considerable amount of blindness. It is an established factor in 2 per cent of blindness among children and adults; is presumed to be present in at least an additional 11 per cent of blindness among children; and may be the causal factor in many additional cases among both children and adults whose family histories have not been investigated.
5. Other significant causes of blindness are such "general diseases" as diabetes, nephritis, and diseases of the vascular or nervous systems, which account for 2 per cent of blindness among children and 6 per cent among adults; "neoplasms" (tumors), which account for 3 per cent of blindness among children and 1 per cent among adults; and "poisoning," which accounts for 1 per cent of blindness among adults.

Causes of eye difficulty among the partially-seeing are similar in nature but somewhat different in distribution. For example, there are proportionately many more cases of refractive errors, chiefly high myopia, which cannot be corrected to normal with glasses or which are progressive in nature.

Prevention of Blindness

The program of prevention utilizes a variety of methods and leadership. For convenience, these will be presented separately.

Obviously, the emphasis in prevention programs should be on elimination of underlying causes of blindness. However, when the etiology is unknown, the immediate objective must be treatment for arrest or correction of the eye lesion itself. Two such conditions, unfortunately, are among the major causes of loss of vision:

1. Cataract, in which by needling or removal of the opaque crystalline lens in the eye and provision of glasses, the patient may be given good vision.
2. Glaucoma, in which, if diagnosis is made in the early stages and the patient continues under ophthalmological supervision, useful central and peripheral vision may be retained throughout life.

Infectious diseases, which have taken a large toll of eyes, can be prevented at the source by control of their spread, or be adequately treated to prevent disastrous sequelae. Communicable disease control measures include necessary legislation, such as required use of prophylactics in the eyes of the newborn, and compulsory premarital and prenatal examination and treatment for syphilis. Venereal disease control may play as spectacular a role in prevention of blindness as compulsory vaccination, which has made blindness from smallpox practically a thing of the past.

Discovery of the new drug, sulfanilamide, which has been demonstrated as a cure for trachoma, provides a new and effective weapon in the age-long war on this disease.

Similarly, improved and new techniques in eye surgery now make possible re-attachment of a separated retina, and replacement of an opaque cornea with clear tissue from another eye.

Control of hereditary blindness is gradually being accomplished by enlisting the co-operation of those in whom serious anomalies of eye structure are proved hereditary.

Safety education and other measures for elimination of eye injuries in industry, home, etc., have proved effective, particularly when supplemented by legislation, as in laws prohibiting sale and use of fireworks and air rifles, codes specifying safety equipment in industry, etc.

More and more individuals considered blind are being removed from this category by the route of adequate ophthalmological examination, followed by medical, surgical or even mechanical (eyeglass) correction. In fact, the correction and prevention programs of some state welfare departments have developed as a result of the need discovered in examining applicants for aid to the blind.

Maintenance of general health and nutrition is beginning to be appreciated as the ounce of prevention which may protect the eyes from disaster.

Conservation of Vision

Special education to conserve the vision of individuals who without proper safeguards might become blind, or of those with vision so low as to require special materials, can be provided in the public schools in so-called sight-saving classes, of which there are now

605 located in 29 states. In these classes large-type books and typewriters, maps in bold outline without detail, pencils, pens, and crayons that produce broad lines, etc., are used. Also, the specially trained teacher adapts the work of the regular grades to the needs of her pupils by permitting them to take their places in the regular classrooms only during periods when no close work is required; even in the well-lighted sight-saving classroom she shortens the periods of eye work and substitutes eye-saving materials and methods whenever possible.*

High school education, either in special classes or in regular classes with the aid of a reader, and special vocational testing, guidance, and training are recognized needs of this group, but such facilities are not generally available.

To be adequate, conservation of vision of the children in regular grades, as well as of younger children, should include methods and materials to assure eye comfort and efficiency of the students during the educational process, adequate service for detection of visual defects, community facilities for their correction, and proper school and home lighting. It is recognized that these objectives will not be reached until the basic training of teachers and nurses includes more adequate eye health knowledge.

Prevention of Blindness Agencies and Personnel

In organizing a prevention of blindness and sight conservation program, the objective should be to integrate eye care into the broad general programs of existing official and voluntary agencies in the community responsible for health, welfare, education, safety, etc. The function of a prevention of blindness agency, therefore, is to stimulate and co-ordinate such efforts. To illustrate: state and local health officers are responsible for enforcing laws requiring use of prophylactic drops in the eyes of the newborn, and for seeing that cases of ophthalmia neonatorum are reported, and adequate medical and nursing care provided in each such case; but the stimulation of these measures in all states has been part of the program of the National Society for the Prevention of Blindness. Similarly, school authorities are responsible for setting up, financing and supervising sight-saving classes; but public education to show the

* See Cohen, *infra cit.*

need for such classes, as well as demonstration of proper training for sight-saving class teachers, is also part of the National Society's program.

State voluntary agencies function in much the same way, although in connection with certain activities they may carry more responsibility for details. When a state agency is set up as a division of an official state department, such as the department of welfare, it may function only in the general area of activity of that department, or it may associate itself with a co-ordinating group representing all other official departments and voluntary agencies concerned and thus enlarge the scope of the program.*

Because of the broad nature of the program for sight conservation and the prevention of blindness, leadership and responsibility must be shared by many professional groups. To prepare these groups adequately for work in this specialized field, the National Society has helped appropriate educational centers to organize and finance courses for sight-saving class teachers and supervisors, for medical social eye workers, and for health educators in teacher training institutions. Short in-service-training institutes for public health nurses and others have also been conducted. As part of its educational service, the Society maintains a reservoir of the materials needed by prevention workers, including periodicals, pamphlets, films, exhibits, and vision-testing charts, and gives advisory service in the field and through correspondence.

Ophthalmologists working in private offices, operating rooms and out-patient departments have provided the medical care which is basic in prevention of blindness programs. They are further participating by serving as supervising ophthalmologists and examiners in state programs for aid to the blind, as advisers to departments carrying prevention of blindness programs, and as examiners and treatment specialists in services organized for trachoma patients, as well as for those in rural areas. In addition, through conservation of vision committees of state and county medical societies, this group is making a valuable contribution to public education.

* Because of the rapid growth in the number of agencies having responsibility for various parts of the program any list must be incomplete. Inquiries as to resources in any region may be addressed to the National Society for the Prevention of Blindness.

Bibliography

Committee on Statistics of the Blind:

Berens and others. "The Causes of Blindness in Children: Their Relation to Preventive Ophthalmology." *Journal of the American Medical Association.* December 14, 1935.

"Classification of Causes of Blindness: Second Revision—June, 1939." *Outlook for the Blind.* June, 1939.

Kerby and McKay. "Eye Conditions Among Pupils for the Blind." *Outlook for the Blind.* October, 1937; June and December, 1938; December, 1939; and December, 1940.

National Society for the Prevention of Blindness:

Catalogue of Publications. Pub. No. 32. 16 pp. 1940.

Cohen, Marcella S. *The Visually Handicapped Child in the Rural Community.* Pub. No. 335. 12 pp. 1940.

Conserving the Sight of School Children. Pub. No. 6. 54 pp. 1935.

Harrison, Anna M. *Possibilities of Restoration of Sight and Prevention of Blindness in the Aid to the Blind Program.* Pub. No. 334. 20 pp. 1940.

Lewis, Park. *What You Should Know About Eyes.* Pub. No. D60. 82 pp. 1937.

Page, Harry O. *Prevention of Blindness as Seen by an Interdepartmental Council.* Pub. No. 306. 8 pp. 1939.

SIGHT-SAVING REVIEW. Quarterly.

Social Security Board:

Instructions to State Agencies Participating in the Study of Causes of Blindness Among Recipients of Aid to the Blind. Sections I–II, 17 pp. Section III, 24 pp. 1940.

A Digest of Problems of Vision Testing for Screening Purposes*

Eleanor W. Mumford, R.N.

The REVIEW introduces in this issue the first of a series of digests on problems of vision testing for screening purposes. The material, presented by Miss Mumford, is not inclusive but represents a selection reviewed by one of the Society's committees, of which she is a member, which has been studying problems of screening for eye conditions. The selection does not indicate that the committee either accepts or rejects the methods or conclusions of the studies digested, but rather that each study has some bearing upon the consideration of problems of vision testing for screening purposes.

THIS is the first installment of a series of abstracts of published material relating to "screening procedures" used by health agencies in discovering individuals to refer for a thorough eye examination because of suspected eye defects or disease. This project was undertaken because of wide interest on the part of health workers and a healthy dissatisfaction with present methods, and because much of the material included is not readily available to workers and administrators responsible for screening procedures.†

The series will include studies of visual functioning or of vision testing methods—the latter from the point of view of their use by health workers for screening purposes. As far as possible the former will be so presented as to indicate the tests and techniques used and the criteria for classification of defects or disease. Effort has

* See page 54, editorial by Dr. Thomas H. Johnson, chairman of the Committee on Vision Testing Procedures. In an early issue Miss Mumford will discuss problems involved in screening for eye conditions.

† Two mimeographed bulletins on screening for eye defects are available on request from the National Society for the Prevention of Blindness: "Recommendations Concerning the Purposes of Screening for Eye Difficulties," and "Eye Inspection and Vision Testing."

been made to follow a uniform pattern to make the data in both types of studies as comparable as possible, selecting such items from the studies as seem pertinent to screening problems. Since some are far more complete than others, footnotes and parentheses have been used to call attention to certain gaps which affect comparability of data, results, or procedures. In some of the studies certain items which seem important are covered by general statements which do not lend themselves to exactness in abstracting. Where this is true, the original statement is quoted. Quotations are also used to emphasize statements of observation or from previous experience of investigators which seem to have important bearing upon screening practices. These abstracts will be followed by briefer digests of data relating to the scientific bases of tests used in screening procedures and factors influencing results.

The Eyesight of the School Child as Determined by the Snellen Test. S. D. Collins. *Public Health Reports*, vol. 39, no. 48, Nov. 28, 1924, pp. 3013–3027.

PURPOSE OF STUDY

To determine the visual acuity as indicated by the Snellen test and to analyze statistically the incidence of defective vision by age and sex.

GROUP STUDIED

Approximately 12,000 children (6–16 years of age) in eastern states from New York to South Carolina, mostly in rural schools.

TESTS AND TECHNIQUES EMPLOYED

Snellen: At 20 feet; illumination not specified; illiterate chart for children who could not read—type of illiterate chart not specified.

METHODS OF CONDUCTING STUDY

Tests made by United States Public Health Service as part of general physical examination. The cases were classified in 10 groups according to visual acuity.

FINDINGS

1. Children 6–16 years of age who had
   a. Normal visual acuity* in both eyes (20/20 or better) . 62.9%
   b. 20/25 or 20/30 in one and 20/30 or better in the other eye 27.1%
   c. 20/40 or 20/50 in one and 20/50 or better in the other eye 6.1%
   d. 20/70 or less in one or both eyes 3.9%

* Visual acuity in this study is expressed as a fraction in tenths, a table being presented to translate these fractions into the usual Snellen fractions which are used in the digest.

2. Children with 20/70 or less in both eyes 1.6%
3. Sex as a factor:
   a. Normal vision: in higher percentage of boys than girls.
   b. Poor vision: percentage about equal in both sexes.
4. Age factors:
   a. Percentage with normal vision in both eyes (20/20 or better) rose with age (6–16 years).
   b. Percentage with better than 20/20 vision in both eyes rose with age while percentage with just 20/20 vision in both eyes decreased.
   c. Percentage with slight defects decreased with age while percentage with serious defects increased with age.
5. Vision of right and left eye classified separately:
   Vision in each eye shows the same general tendency as to age and sex as already described for the two eyes combined.
6. Correlation between vision of right and left eye:
   a. Of children with normal vision in one eye, 91.3 per cent had normal vision in the other.
   b. Of children with defective vision, the percentage of those who had the same vision in the left as in the right eye was much larger than the percentage of those who had other degrees of defect. However, there seemed to be a greater tendency for equal vision in both eyes among children with better vision than among those with poorer vision and this tendency to unequal vision was more common in children with seriously defective vision.

Variation in Eyesight at Different Ages, as Determined by the Snellen Test. S. D. Collins and R. H. Britten. Reprint No. 979 from the *Public Health Reports*, Dec. 19, 1924, pp. 3189–3194.

Purpose of Study

A comparison of visual acuity of school children and of adult workers.

Group Studied

4,862 native white boys 6–16+ years of age and 6,479 male white industrial workers chiefly over 18 years of age.*

Tests and Techniques Employed

Snellen: Illiterate (type not specified) and lines of letters. (Techniques reported on in previous studies.)

Methods of Conducting Study

Tabulation of previous studies.

* Vision of both groups has been reported on more extensively in previous reports. See preceding digest and "Standards of Measurement of Ten Thousand Male Workers: Preliminary Note, with Special Reference to Racial Factors," L. R. Thompson and Rollo H. Britten. *Am. Jour. of Pub. Health*, Vol. XIV, no. 5, pp. 383–390, May, 1924.

FINDINGS

1. Normal vision (20/20 or better in both eyes): The percentage classed as normal increased with age from 57 per cent at 6 years to 77 per cent at 20, then declined, and of the group over 60, only 5 per cent were classified as normal.
2. Moderately defective (20/40 or 20/30 one eye and 20/40 or better in the other): The percentage in this class decreased during the school years but rose from 20 to 50 years, then again declined. Apparently during the school years some shift into the normal group, others to the markedly defective group, but after 50 many who were previously classed as having moderate defects develop more serious ones.
3. Markedly defective (20/50 or less in one or both eyes): The percentage in this group rose steadily from 6 years of age and most rapidly after 45. Up to 40 years of age only 15 per cent were in this group, but at 65 years, 70 per cent were classed thus. The rate of increase was more rapid in school age children than in the adults under 45.

Vision Survey Among a Group of Pupils of Syracuse Schools. H. H. Levy, M.D. *American Journal of Public Health,* Vol. XVIII, no. 10, Oct., 1928, pp. 1273–1281.

PURPOSE OF STUDY

To determine age at which school children's vision should be tested, desirable methods, ability of school physician to detect defects.

GROUP STUDIED

4,060 school children 5–17 years, varied nationality and economic status.

TESTS AND TECHNIQUES EMPLOYED

1. *Snellen* (Symbol E for illiterates): Distance 20 feet; "illuminated by direct light greater than 10 foot-candles"; later the chart was mounted on a board to which was affixed a student-lamp-type of illumination with a 50-candle-power frosted bulb.*

2. *Ives apparatus.*

3. *Inspection* of lids (everted), pupillary reflexes, cornea, fundus, muscle balance (method of testing not specified).

4. *History and symptoms.*

METHODS OF CONDUCTING STUDY (Very little detail given).

1. After 1,499 children had been tested with both Ives and Snellen, correlation was found close and Ives was eliminated as less satisfactory.

2. Routed to family physician or oculist "those with 20/40 or less and those with better than 20/40 who had other symptoms."

* The intensity of illumination with this apparatus is not indicated.

Findings

1. Ives apparatus unsatisfactory, subjective, not suitable in first and second grade, not easily transported, expensive.
2. Of 4,060 children, 3,910 were hyperopic, 142 myopic, 8 had mixed astigmatism, 63 strabismus.* Of the entire group, 16 per cent were referred for refraction, 9.5 per cent because of low visual acuity, 6.7 per cent because of other symptoms (not listed in detail but classed as "asthenopia").
3. Percentage of children routed for refraction was lowest among 5 and 6 year olds (roughly 8 per cent of each group), rose to 25 per cent of the 15 year olds. By grades the highest percentage of referrals (23 per cent) was in the seventh grade, except for the deaf and ungraded classes where referrals were approximately 30 per cent of the groups.
4. The percentage of those who had failed one or more grades was higher for those with defective vision (39 per cent boys, 34 per cent girls) than for those with normal vision (34 and 25 per cent respectively for boys and girls).

Refractive Errors in the Eyes of Children as Determined by Retinoscopic Examination with a Cycloplegic. Results of Eye Examinations of 1,860 White School Children in Washington, D. C. G. A. Kempf, M.D., S. D. Collins, and B. L. Jarman, M.D. *Public Health Bulletin*, no. 182, Dec., 1928. United States Public Health Service, Washington, D. C.

Purpose of Study

To determine prevalence and degree of refractive errors at various ages.

Group Studied

1,860 unselected white school children of Washington, D. C., 6 to 14 years of age.

Tests and Techniques Employed

1. *Snellen test:* artificial illumination "always as high as 20 foot-candles on darkest part of chart."† (With and without cycloplegia.)

2. *Retinoscopy.*

3. *Wheel chart tests* for astigmatism.

Methods of Conducting Study

1. Visual acuity tests were made without glasses and for right eye only. They were given before and after cycloplegic.

2. To assure that group accepting cycloplegic was representative, a control group of 1,000 children who refused cycloplegic was set up and

* No mention of cycloplegia, and degree of errors not reported.

† Method of illuminating chart not specified.

visual acuity for study group was compared with that of control group and also with data from a previous study.*

3. Wheel chart was eliminated with small children as unsatisfactory.

Findings (Presented in tables, graphs, and text):

1. The average child in the study had 0.50 to 0.75 of a diopter of hyperopia. At 6 to 8 years of age the average was 0.75 to 1.00 diopter of hyperopia and at 12 to 16 it was 0.50 of a diopter of hyperopia.
2. The prevalence and degree of hyperopia tended to decrease with age while myopia and astigmatism increased in frequency. This increase was greatest before 11 years of age.
3. Before cycloplegic, 66 per cent had a visual acuity of 20/20 or better, while after cycloplegic only 21 per cent could read the 20/20 line; before cycloplegic only 7 per cent tested as low as 20/50 while after cycloplegic 43 per cent tested 20/50 or less.
4. Retinoscopic examination revealed some degree† of hyperopia or hyperopic astigmatism in 88 per cent; mixed astigmatism in 1 per cent; myopia or myopic astigmatism in 7 per cent; emmetropia in 4 per cent. Twenty-eight per cent of all children showed some form of astigmatism. Eighty per cent of the cases of astigmatism were with the rule, 5 per cent against the rule, and 15 per cent oblique.
5. The range of refractive error was as high as 6.50 D. of hyperopia (2 children) and up to 11 D. of myopia (1 child).
6. Many of the children with relatively high hyperopia tested 20/20 before cycloplegic (1 child +4.50 D. and 14 with +3 to 4 D.). The large majority of the children with +1 D. or less read 20/20, but very few could read 20/15. One hyperope with 5 D. tested 20/30 while two others with like amount tested 20/50 and 20/70.
7. Of the 144 myopes, when tested before cycloplegic, none could read 20/15 while 31 tested 20/20 with refractive error ranging up to −1 D. Of those with high myopia, the one with −11 D. tested 20/70, while two with −4 D. and −4.50 D. tested only 15/200.

School Eye Surveys. Report on a Grammar School. L. Mills, M.D. *California and Western Medicine*, Vol. XXX, no. 3, March, 1929, pp. 168–70.

Purpose of Study

To investigate efficiency of methods used by schools in discovering visual defects or ocular disease in school children.

* Collins, S. D. "The Eyesight of the School Child as Determined by the Snellen Test," *op. cit.*

† Includes all degrees of refractive error, many of which the authors point out are of such slight degree as not to need correction.

Group Studied

566 grammar school children (6–12 years) in Los Angeles School District (study under auspices of Eye and Ear Advisory Board of School District).

Tests and Techniques Employed:

Allport combination letter and illiterate chart with and without correction.*

"Eyedness and Handedness Test" to discover dominant eye, convergence near point, pupillary action, muscle balance. (Author's explanation of test: examiner's back to light with child facing him; a plane mirror placed between the eyes about six inches distant and fairly rapidly brought toward the eyes, the child fixing the aperture. In the adult, master eye normally maintains undeviating convergence while non-fixing eye diverges when mirror comes within two inches of eyes. With children, because of abundance of convergence power, the mirror is introduced suddenly at six inches and if divergence does not occur at two inches, it is held in place for a few seconds until one eye yields or the mirror is reversed and the dull back is presented.)

Methods of Conducting Study:

1. "Evidence of ocular pathology recorded"—"where defective vision, muscle function or pathological changes existed, inquiry was made into presence of symptoms."

2. All cases having defects referred for examination; ophthalmoscope used "where indicated."

3. Referral for examination based on visual acuity of 20/25† or less with or without symptoms or on the presence of symptoms where vision was normal.

Findings (Presented in summary form, no tables, charts or graphs):

1. Visual acuity of 566 children: 82.6 per cent (text gives this as 86.2 per cent)—20/20 or better in each eye; 2.8 per cent—20/20 in one eye, 20/25 in the other; 11 per cent—20/25 in each eye. "The balance . . . scattered through entire practical visual range—lowest visual acuity, 6/60" (20/200).
2. "In general, master eye had better visual acuity in hyperopia and poorer in myopia." Right eye dominant, 69.1 per cent; left eye dominant, 24.3 per cent; no dominance in 5.3 per cent; abduction in 1.2 per cent.
3. Muscle action: normal, 73.7 per cent; excessive convergence, 18.3 per cent: of these, 17.3 per cent showed decided convergence, including 8 cases of alternating strabismus; increased abduction, 8 per cent—usually one eye: of these 13 per cent (6) showed decided

* No data as to techniques of visual acuity test.

† Visual acuity is reported in meters and has been translated into approximate Snellen fractions based on foot measurements.

divergence. "Symptoms were noted in 7.2 per cent of entire group, although 26.3 per cent were found to have some form of muscular imbalance." "Below the third grade fixations were more or less uncertain."

4. Pathological conditions noted "had been recognized by teachers or school nurse and were under treatment or treatment was planned."*
5. "Visual examinations" had been done by school physician and nurse* except for new admissions. Record of previous physical examination not transferred with child.
6. 29 children wore glasses: 16 for "compound hyperopia," 4 for hyperopia, 3 for hyperopic astigmatism, 3 for mixed astigmatism, 3 for "compound myopia." Six children who had been given glasses within a year for over two degrees of myopia or hyperopia "showed decided reduction in vision, indicating that children with moderate to high errors of refraction should be examined yearly at least."
7. Present system effective except in case of transfers and of those wearing glasses.
8. Only 7.2 per cent showed symptoms referable to eyes.

The Vision of Pre-School Children—An Analytical Study of 982 Children. Published by the National Society for the Prevention of Blindness, New York, N. Y., 1930. (Out of print.)

PURPOSE OF STUDY

To investigate the need for vision tests of young children, especially of preschool age, and through their alleviation and correction, to decrease eye defects among school children.

GROUP STUDIED

982 children connected with settlements in New York City; ages 3 to 6 years, except for 136, 68 of whom were "6 years old and over" and the age of the other 68 was not reported. Nationalities included Italians, Polish, Irish, Jewish, English, Chinese, American, Syrian, Colored and Puerto Rican.

TESTS AND TECHNIQUES EMPLOYED

A. By lay testers (nurse)
   1. *Snellen Symbol E:* distance, 20 feet; artificial illumination (shedlight), 10 to 12 foot-candles; test objects presented singly by means of black "window cards" with appropriate sized holes; procedure conducted as a game in which Symbol E was presented as an animal with legs (shafts of the Symbol) pointing in a given direction. Child indicated the direction of the shaft by pointing. (Test objects presented in vertical and horizontal positions.)
   2. *Muscle balance test* (near): distance, 10 to 12 inches; alternate screen fixation test. A small card was used to cover one eye while

* No data presented on methods.

the gaze of the other was fixed on a large, bright-headed pin; after the covered eye had had time enough to relax, the card was shifted to cover the other eye, the tester observing to note presence of a shift in direction of the gaze of the eye first covered. Procedure repeated for each eye.

3. *Inspection:* (a) size and equality of pupils and light reaction; (b) appearance of eyes and adjoining tissues and general appearance and behavior.

B. By ophthalmologists

1. (No exact statement of the ophthalmological tests); mydriatic in approximately one-half of the 232 children examined by the ophthalmologist. Findings (for those examined) are presented regarding refractive errors, muscle imbalance, abnormal or pathological conditions of eyeballs, lids, and conjunctiva.

Methods of Conducting Study

1. Selection of vision test chart and development of game technique:
   a. Trial and error used to eliminate pictograph and Landoldt Broken Circle Chart.
   b. Experimentation to develop device (black "window cards") to concentrate attention.*
2. Development of muscle balance and inspection procedures: game technique worked out experimentally by nurses.*
3. Nurse referred for ophthalmological examination those she suspected to have defects. Such referrals were based on: visual acuity 20/40 in worse eye, with or without other symptoms; muscle balance test; observation or history of symptoms, regardless of visual acuity.
4. Ophthalmological examination only for those referred by nurse.
5. Ophthalmological examinations made by twelve ophthalmologists ". . . the ophthalmologists followed their usual office practice with regard to the use of mydriatic in particular cases . . ."

Findings (Presented in tables, charts, graphs, and text)

1. Analysis of nurse's findings: 982 children
   a. Disposition of cases: dismissed as apparently normal, 632; referred to ophthalmologist, 350; examined by ophthalmologist, 232; "lost cases," 118.
   b. Symptoms leading to referral: visual acuity 20/40 or less with or without other symptoms, 189 children; visual acuity 20/20 or 20/30 with symptoms or history, 129 children; "other symptoms" leading to referral include: squint or suspected muscle imbalance, 143 children; inflamed lids, conjunctiva, sclera, or congestion of cornea, 209 children; irregularities of cornea, iris, or pupils, 13; sensitivity to light or slow light reaction, 18; blinking, itching,

* Details as to figures and experimental methods not presented.

tearing, pain, 4; frowns, headaches, slow reading, 44; unusual positions of head, neck, or shoulders, 39. (Eighteen of the children referred had a visual acuity of 20/200 or less in one eye without correction.)

2. Analysis of ophthalmologists' findings: 232 children
   a. On the basis of the findings for those examined, it was estimated that 20.9 per cent of the entire group of 982 children had some abnormality. On the same basis, it was estimated that:

      18.0 per cent had refractive errors.
      4.7 per cent had squint or muscle imbalance.
      2.8 per cent had inflammations of lids or conjunctiva.
      1.4 per cent had abnormal conditions of the eyeball.

   b. Visual acuity with and without mydriatic is recorded for 212 eyes. Most of the children showed a much lower visual acuity with mydriatic than without. Of 41 children whose vision was 20/20 without mydriatic, only 2 had an equal visual acuity with mydriatic while 10 had only 20/200.
   c. The percentage of children with a visual acuity of 20/20 or better without mydriatic ranged from 16 per cent in the 3 and 4 year olds to 58.9 per cent in the 6 year olds and over, with 31.6 per cent of all of the children able to read 20/20. There was a corresponding decrease in the number whose visual acuity was recorded as 20/30. There was no apparent trend in the figures for visual acuities of less than 20/30. There were more girls than boys in the 20/30 and 20/40 groups.
   d. There were more girls with refractive errors than boys (19.4 versus 16.8 per cent). The incidence of specific refractive errors was: hyperopia, 7.1 per cent; compound hyperopic astigmatism, 7.5 per cent; simple hyperopic astigmatism, 1.6 per cent; myopia and myopic astigmatism, 1.3 per cent; mixed astigmatism, 0.3 per cent. The range of refractive errors was in the case of myopia (23 cases) from under 1 (8 cases) to 10 D. (2 cases); hyperopia (312 cases) from under 1 (85 cases) to 7 D. (1 case).
   e. Squint or muscle imbalance was reported in 46 cases. (This included all who showed tendencies to squint, however slight.)
   f. Abnormal conditions of the eyeball were noted in 14 cases. (The types of abnormalities were not indicated.)
   g. Inflammations of lids or conjunctiva, 28 cases.
   h. There were 26 children who were referred by the nurse as probably needing care whom the ophthalmologist found to be normal.

CONCLUSIONS

1. Latent squint in early age group as brought out by the cover test may be more frequent in preschool children than has been generally thought.

2. Visual acuity may tend to improve during the years of 3 to 6 years.

3. The figures as to nationalities seem to indicate a high rate of squint and low rate of astigmatism among children of Irish parentage; compara-

tively high rate of myopia and astigmatism among Chinese; with a consistently low rate of astigmatism for the colored group.

4. 75 per cent of the refractive errors were between +3 D. of hyperopia and −3 D. of myopia.

5. No marked tendencies were discovered to indicate any correlation between the incidence of abnormalities of the eye and of other physical defects commonly noted in examinations by pediatricians.

6. The largest contribution of the study was believed to be the development of a technique of visual testing for little children which was based on sound psychological principles.

Eye Health Study of Texas School Children. J. G. Jones, M.D., F. M. Hemphill, and J. M. Pinckney. Bureau of Nutrition and Health Education, The University of Texas, Extension Division, Austin. 1934.

Purpose of Study

To determine the eye health problems of Texas school children, with a view to planning a health education program.*

Group Studied

5,748 white school children, grades I to XI.

Tests and Techniques Employed

1. *Snellen E* in electrically lighted cabinet; room darkened (intensity of chart and room illumination not stated); test objects presented singly by use of window cards; distance, 20 feet; both eyes open during test with one occluded by small card. Testing begun at 20-foot line, larger lines used only for those unable to read 20/20.

2. *Inspection:* eyelids, eyes, pupils, pupillary light reaction, conjunctiva, cornea, co-ordination of movements.

3. *Muscle balance:* alternate screen test of fixation. (Large-headed pin held 12 inches from child's eyes, each eye covered alternately, tester watching for movement as cover was removed.)

4. *Ophthalmological examination* (1,162 of group): refraction (with mydriatic, except if parents objected or "in instances involving mild lid or conjunctival condition"), retinoscope, trial lenses, and phoropter (battery of lenses and prisms for checking retinoscopic measurements).

Methods of Conducting Study

1. Ophthalmological examination for those screened out on above tests (written consent obtained from parents). Bases of referral: inability to read 20/20 with either eye, with or without symptoms; slowness in reading chart; symptoms (not defined or listed); muscle imbalance (apparent or suspected because of observed shift during test); reports of accidents; requests of parents or teachers.

* As study includes much extraneous to the digests, only pertinent sections are included.

2. One lay tester checked visual acuity, another muscle balance and inspection of eyes. One ophthalmologist made all the ophthalmological examinations.

3. Results tabulated to show basis of referral numerically, by percentage and by grades.

FINDINGS

A. Analysis of preliminary tests

1. On the basis of preliminary tests, 23.8 per cent were referred for ophthalmological examination. Of total group, 12 per cent unable to read 20/20, defects of conjunctiva noted in 4 per cent, signs of muscle imbalance in 2 per cent, and other signs of eyestrain in 10 per cent.
2. The percentage of children with less than 20/20 vision in either eye increased from 9.4 per cent in first grade through the fifth grade (14.5 per cent), then decreased to ninth grade when it became approximately stable at about 9 per cent.* The majority of those unable to read 20/20 could read 20/30 or 20/40.
3. Muscle imbalance appeared to decrease after third grade.
4. A study of the age-grade factor showed that of the 1,359 referred for ophthalmological examination, many more were overage for grade than were under-age. Over-age frequency decreased from the ninth grade on "because of withdrawal from school."†

B. Analysis of ophthalmological findings

1. Of 1,359 referred, 197 were not examined, 251 were found normal, significant refractive errors‡ were found in 673, strabismus in 73, and pathological conditions in 277 (including the 73 classified as strabismus).
2. Significant refractive errors‡ (found in 673 out of 1,162 children):

Hyperopia	433 children
Hyperopic astigmatism	416 children
Myopia	201 children
Myopic astigmatism	103 children
Mixed astigmatism (not included above)	41 children

3. Analysis by grades and type of error of the cases with one or more diopters of refractive error increased in frequency of hyperopia from the first to the fourth grades, then declined through the

* The point is not mentioned in the text, but from tables there did not seem to be any evidence of a corresponding increase in the prevalence of visual acuity of less than 20/40 in children in these grades.

† The age-grade factor was not analyzed in relation to the ophthalmological findings.

‡ Footnote explains classification of significant refractive errors as those with one diopter or more of hyperopia, one-third diopter or more of astigmatism, or one-quarter diopter or more of myopia.

tenth grade and increased sharply in the eleventh grade. (The proportion of hyperopes to the total number having refractive errors was progressively lower as grades advanced.) There was more myopia in the upper than in the lower grades, marked increase being found in the fifth grade and continuing more gradually to the tenth grade, with another large increase in the eleventh. The prevalence of hyperopic astigmatism remained approximately static in all grades while the 10 cases of myopic astigmatism were found scattered in six different grades.

4. Visual acuity (Snellen test) showed a fair degree of correlation with the presence of significant errors, especially with myopia; but high refractive error was sometimes found in children with good visual acuity rating and vice versa.
5. The association of headaches with a low rather than a high degree of error was interpreted as indicating that those with gross errors learn to tolerate their defects.
6. Girls showed a higher prevalence of all types of refractive errors than boys.
7. Of the 332 wearing glasses, 121 had had ophthalmological examination before the glasses were fitted; the examining ophthalmologist found no significant error in 51 and found 81 wearing glasses at variance with his findings of refractive error.
8. Of the 73 cases of strabismus, 68 were convergent, 2 divergent, and 9 alternating. (No indication of degree of deviation from normal classed as strabismus.) The majority were found in the first four grades.

NOTE: No estimation is made of the prevalence of visual defect in the entire group. Such a figure would have to be estimated as the group given ophthalmological examinations represented only those selected as suspected of having defects.

An Evaluation of the Incomplete Square Test of Visual Acuity for Young Children. R. L. Wilder, M.D., K. A. Petrie, M.D., and J. L. Marquis, Ph.D. *American Journal of Diseases of Children*, vol. 50, Nov., 1935, pp. 1182–1186.

PURPOSE OF STUDY

To find a test for visual acuity applicable to children not able to read letters, to determine a practical set of standard conditions for testing and the reliability of test under these conditions.

GROUP STUDIED

17 children, 5 to 6 years of age, at Institute of Child Welfare, University of Minnesota.

TESTS AND TECHNIQUES EMPLOYED

1. *Visual acuity* tested with incomplete square. The test object was a single broken-square figure (Jackson's): 9 mm. square, sides filled for

a distance of 3 mm., opening 3 mm. wide, placed in center of a 10 cm. square of white cardboard.*

Technique: Child indicated by pointing the direction of shafts of square which was shifted in vertical and horizontal positions. A large blank white card was placed on the wall as a background. Tester held test card against this background. Room darkened by drawing shades; chart lighted by 100 watt Mazda lamp in student lamp reflector, placed 35 cm. from chart.† Floor marked off at 1-meter distances (39.37 inches) to 10 meters (32.8 feet). Testing started at 10 meters with four trials, the square being rotated to each of the four cardinal positions. If mistake was made, the child was moved forward 1 meter until distance was reached where with both eyes together he could read the test in all four positions. Each eye was then tested separately starting again at the 10-meter line. ("Three correct readings at a distance of 10 meters is normal vision, according to Jackson."*)

2. *Snellen E* test at a distance of 10 meters (other techniques not indicated).

Methods of Conducting Study

1. 14 of the group tested 10 times with broken square test at intervals of 3 to 10 days and twice with Snellen E.
2. Total errors on 10 trials with broken square correlated with total errors on Snellen E.
3. Data for right and left eye combined for second correlation.
4. Correlations calculated for errors on certain trials of test and total errors for all 10 trials, the data for right and left again being combined.
5. Visual acuity was expressed in a fraction, the numerator indicating the size of the test object (10 meter size) and the denominator the greatest distance in meters at which correct reading was obtained.

Findings

1. After the first trial, a child's performance was consistent through the 10 trials.
2. Three trials correlated 0.931 with 10 trials.
3. The best measure of visual acuity (with broken square) was obtained from trials 2 and 3.
4. "The broken square is a reliable and practical test for visual acuity of preschool age children" (as tested against tests with the Snellen Symbol E).

* In a table of visual acuity equivalents, E. Marx (Berens, *The Eye and Its Diseases*, p. 173) gives the following regarding sizes of test objects:

20/20 (6/6) size object = 8.86 mm. with limbs of 1.77 mm.
20/30 (6/9) size object = 12.27 mm. with 2.65 mm. limbs.

† No indication in foot-candles of intensity of chart light or room light.

Editorial

Vision Testing Procedures

IN ANOTHER section of this issue, the REVIEW presents the first installment of abstracts of material pertinent to "screening procedures" for the discovery of probable eye defects or disease.

Ideally, everyone should have periodic eye examinations by a competent eye physician (oculist). This is especially important for young children in the active, growing years, and for persons in mid-life and later, when degenerative changes occur. However, since such service is not universally available, it has been found desirable by health agencies to develop, as a supplementary service, procedures suitable for use in screening out for careful examination those suspected of having eye difficulties.

For the widest application, these procedures must be of such a nature that they can be used by general medical practitioners, nurses, teachers, or "lay" personnel. They should be sufficiently accurate to discover significant eye conditions and they should be simple and easy to use. Facilities available in the agencies using these tests vary greatly as to personnel and equipment, and there is also variation in the age groups served; therefore, these tests must be adjustable to be useful in many types of situations.

As will be readily seen, problems involved in the development and use of the various visual screening procedures include not only the development of tests which are ophthalmologically sound, but important problems of administration and of psychology. Thus this is a field which is of interest to a wide range of people, including the personnel who must give the tests, and the administrators of health services responsible for program planning, purchase of equipment, etc., in addition to the psychologists who frequently depend upon these procedures to supplement various psychological tests. That these groups need the expert ophthalmologic guidance seems self-evident.

The National Society for the Prevention of Blindness has long been interested in these problems and is looked to by health per-

sonnel as an authority in this matter. For some time one of its Committees has been investigating published material on various aspects of the problems involved. Data are to be found in various scientific publications, as well as in a few more general types. Recent medical literature contains many reports of studies of the application of various ophthalmological tests to this purpose.

However, as much of this material is not readily available to many whose interest is vital to the success of a widespread program of screening, the Society has decided to abstract and publish some of the material which the Committee has recently reviewed and believes especially pertinent. It is the hope of the Committee that this will lead to critical evaluation of present practices and to collaboration of the various professional groups who are concerned with the vital problem of the early discovery of eye conditions.

—Thomas H. Johnson, M.D.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request.

The Effect of Vision on Reading Ability *

Efficient reading is so necessary for the attainment of success in modern civilization that progressive educators, parents and students are demanding a thorough study and possible solution of the problem of reading ability. Many delinquencies in schools and colleges are attributed to poor reading habits which are often due to defective eyesight. Numerous failures in adult life are due to inability to assimilate printed material rapidly and efficiently. The amount of information necessary to advance the economic and social status of the individual has increased tremendously since the turn of the century. This means that an enormous amount of additional reading is required to attain success in modern life. It also means that the eyes are burdened with almost insurmountable tasks.

The reading problem has become so acute that instructors in most schools, whether public or private, make some attempt to gauge visual efficiency and require eye examinations when necessary. Unfortunately, the problem does not end with perfunctory eye examinations, and it is often necessary to follow through with more tests and such treatment as needed.

A study of 42 cases of reading disability showed that slightly less than half were improved with corrective lenses and orthoptic exercises. The age of the patients varied from eight years to fifty-two years, the average being twenty-three. There were 25 males and 17 females, with three of the males partially color-blind. Only three cases of squint were included in the group. The remainder exhibited

* Presented before the section of ophthalmology of the New York Academy of Medicine, March 18, 1940.

refractive errors, phorias, or fusion difficulties. Hyperphoria was present in only three cases. Glasses were prescribed for the first time in 7 cases, changed in 12 cases, and unchanged in 9, making a total of 28 patients wearing lenses.

Fusion was present in 39 patients—third grade in 26 cases, and second grade in 13. The squint cases showed no evidence of fusion when examined at their deviation. One was a case of amblyopia exanopsia and the other two were alternating squints.

Orthoptic training and corrective lenses gave subjective and objective improvement to 18 cases. There was no improvement in 10 cases, and 14 were seen on two occasions only.

The routine followed in the 42 cases considered in this study consisted of:

1. Determination of vision uncorrected and corrected.
2. Near-point of accommodation without and with correction.
3. Near-point of convergence.
4. Muscle balance by screen test and Maddox rod for distance and near.
5. Prism convergence and divergence for distance and near.
6. Degree of fusion with the hand stereoscope and Ishihara color test.
7. External and internal examination.
8. Manifest refraction.
9. Amplitude of fusion for distance and near on a major amblyoscope.
10. Cycloplegic examination.
11. Post-cycloplegic examination and treatment.

The obvious fact that good vision and muscular co-ordination are necessary for rapid assimilation of printed matter is indisputable. Certain other factors are essential, such as: adequate light, proper environment, ability to concentrate, and good mental and physical health. If the above factors are favorable, there is hope that, by proper correction of refractive errors and orthoptic training, the patient may become an efficient reader, provided good remedial treatment is available. The mechanics of reading should be directed by a trained technician familiar with the various psychic and mental phases of reading. If the ophthalmologist has given the patient the best glasses possible and has increased the amplitude of fusion to allow for good reading, he should be content to have remedial training directed by one more expert in that field. It is often necessary for the ophthalmologist to continue observations and exercises while remedial training is in progress, and it is most important for him to co-operate until results are attained.

Comparatively few people have normal vision in every detail. A person may be able to see perfectly in the distance with both eyes but less

than normal when using each eye separately. Various errors of refraction influence visual acuity for both distance and near. If the errors of refraction are great enough and not corrected properly, the patient's reading progress is impeded. Proper attention should be devoted to possible size differences of the retinal images and the condition of the intrinsic and extrinsic ocular muscles.

Good muscular co-ordination is necessary to make an efficient reader. We often fail to appreciate that there are intrinsic as well as extrinsic ocular muscles which have to work in perfect harmony to attain good binocular single vision. A disturbance of the function of any one of these muscles may be enough to affect seriously the ability to digest printed material. Variations in the near-points of accommodation and convergence, with consequent fatigue, play important parts in the use of the two eyes together. A weakness or over-action of the medial recti muscles frequently results in asthenopic symptoms incompatible with normal reading ability.

The conclusions made from a study of 42 patients complaining of reading disability showed that:

1. Binocular single vision with depth perception or third grade fusion is essential for efficient reading.
2. Cases of heterophoria are helped by orthoptic exercises and refractive correction.
3. Cases of heterotropia are not helped appreciably by orthoptic training and refractive correction.

—Brittain Ford Payne, M.D.
New York, N. Y.

News of State Activities

THIS Section is devoted to the reporting of sight conservation activities carried on by official and voluntary agencies throughout the country. It presents information supplied by these groups, and serves as a medium for exchange of experiences. Only brief and timely items can be used, because of the limitations of space.

District of Columbia

"The District of Columbia Society for the Prevention of Blindness joined the Washington Society for the Hard of Hearing and the Washington Heart Association in a program at the February luncheon meeting of the Health Division, Council of Social Agencies. The President of the Board of Education, who is a member of the Board of the Society for the Prevention of Blindness, prepared a talk on 'Prevention of Blindness in the District of Columbia.' A paper on 'Help Save Their Hearing' was presented by an otologist, and 'Heart Disease in Children' was discussed by a cardiologist.

"The Health Division distributed mimeographed booklets entitled, *Eyes, Ears, Heart,* offering a quiz on these subjects; general information on the visually handicapped, the hard of hearing, and the cardiac; and a directory of clinics and of educational facilities for the handicapped."

—District of Columbia Society for Prevention of Blindness, Washington, D. C.

Illinois

"Recently the WPA in Washington asked for some total figures on the two eye testing projects in Illinois. The Chicago Project has been in existence since 1936 and the Illinois Project has been in existence since August of 1938. We had no idea of the scope of these two projects until we actually compiled the figures, which are simply breathtaking.

"It was found that during this period of five years on one project and two on the other, 1,228,949 children had their vision tested. Of that number, 146,082 defects were found, of which 56,087 were 1X cases; 66,513 were 2X; and 23,482 were 3X.

"On the correction program it was discovered that 37,848 chil-

dren have had their vision corrected, which is about a 33⅓ per cent correction. It is to be understood that we do not work for correction on 1X cases, so the 37,848 cases represent a correction program on 2X and 3X cases. It was figured that on the 3X cases we had about a 66⅔ per cent correction, and on the 2X cases about a 50 per cent correction.

"The Down-State Project has operated in 59 counties of the 102 in Illinois. The Illinois Society during the past year has run three training courses for the workers on these projects and extends constant and close supervision over the work."

—*Illinois Society for the Prevention of Blindness, Chicago, Illinois*

Indiana

"The Committee is sponsoring Legislation on Ophthalmia Neonatorum this year, trying to get the State Health Board interested in trachoma treatment for children. Published eye articles in the May, 1940, issue of the *Indiana State Medical Association Journal.* Held a breakfast conference during the annual meeting of Indiana State Medical Association at French Lick, Ind., in October, 1940."

—*Committee of Conservation of Vision for the Indiana State Medical Association*

Minnesota

"The November, 1940, packet distributed to physicians by the Minnesota State Medical Association in their 'Co-ordinated Medical and Public Health Program' concerned the prevention of blindness. The following items were included in this packet:

"1. 'The Cross-Eyed Child' (Diagnosis and Treatment), by Hendrie W. Grant, M.D., St. Paul.

"2. 'Common Eye Injuries,' by Erling W. Hansen, M.D., Minneapolis.

"3. 'Glaucoma' (Treatment and Features of Interest to the Internist), by W. L. Benedict, M.D., Rochester.

"4. 'Glaucoma,' by Edward P. Burch, M.D., St. Paul.

"5. 'Safeguards in Cataract Surgery,' by Frank E. Burch, M.D., St. Paul.

"6. 'Blindness Due to Neglect,' by Frank E. Burch, M.D., St. Paul.

"7. 'Some Principles Involved in Surgery of the Extra-Ocular Muscles,' by Avery DeH. Prangen, M.D., Rochester.

"8. 'Causes of Blindness in Minnesota,' by Charles E. Stanford, M.D., Minneapolis.

"This information is given to physicians to aid them in interpreting medical and public health problems to non-medical individuals and groups in the communities in which they practise. To further support the information contained in the packet, an abstract of this material was prepared by Dr. D. A. Dukelow of the Minnesota Department of Health for publication in the *Minnesota Registered Nurse.*"

—*Minnesota State Department of Health, St. Paul, Minnesota*

Missouri

"The Anti-Fireworks Bill has been introduced in the Missouri State Legislature, entitled House Bill No. 160. It is being actively sponsored by the St. Louis Safety Council, those of the Kansas City and St. Joseph Councils, and this committee is doing everything it can in the support."

—*Committee of Conservation of Eyesight,*
Missouri State Medical Association

Tennessee

"*Sight Conservation Activities in Tennessee from December 1, 1940, to February 14, 1941.*—The statement was made in our last contribution that the survey of the blind of the state, in regard to the causes of blindness prevalent in the state, was about 75 per cent completed, comprising 3,126 cases, of which 455 were children; the major causes of blindness prevalent in the state are as follows:

		Per Cent
1.	Cataracts (all types except traumatic)	18.24
2.	Foci of Infection	11.70
3.	A. Injuries	10.46
	B. Sympathetic Disease	1.87
4.	Hereditary Eye Conditions	9.86
5.	Acute, Infectious and Contagious Diseases	9.14
6.	Syphilis of the Eyes	7.52
7.	Glaucoma	7.02
8.	Refractive Errors	4.19
9.	Congenital Eye Defects	3.78
10.	Ophthalmia Neonatorum	3.39
11.	Miscellaneous Causes (cardiovascular, neoplasms, systemic diseases, pterygia, etc.)	4.76
12.	Unclassified as to etiology	8.08
	Total	100.01

"On January 30, 1941, a Fireworks Survey was begun, letters being written to 192 eye physicians and general hospitals, requesting that reports on all fireworks injuries to the eyes and other portions of the

body during the period from July 1, 1938, to January 10, 1941, be reported to the Service. To the present date 57 physicians and 35 hospitals, for a total of 92 answers to these letters, have been received, which means that the Survey is 47.8 per cent completed. Sixteen eye injuries were reported, six eyes being lost and one sustaining 90 per cent impairment. Seven burns of the hand were reported, two ruptured eardrums with considerable loss of hearing, and one severe body burn were reported, the latter case being in a little girl who had had sparklers sewed in her dress and who later died. In all, 26 injuries due to fireworks were reported, 14 being in children, two being in adults, and in ten it was unknown whether the injured party was a child or an adult, due to faulty reporting and inability to find records. Twenty-two of these injuries were due to firecrackers, three to torpedoes and one to sparklers. The Service has on record eight other injuries due to fireworks which occurred during the period from July 1, 1937, to July 1, 1938, six being in children and two being in adults, each of the six children losing one eye each, one adult losing both eyes and one adult sustaining a ruptured eardrum with considerable permanent loss of hearing in that ear, all of which were due to firecrackers. This indicates to the Service that Tennesseans should be protected by a Fireworks Law modeled after that which became effective in Pennsylvania in 1939. An unsuccessful attempt was made this year to have such a bill introduced into the legislature, so Tennesseans will be unprotected from these hazards for another two years. Memphis has a well-enforced fireworks ordinance, as is shown by the fact that only four minor burns of the fingers were reported during the two and a half year period for which reports were requested.

"The Centennial Club of Nashville has graciously consented to make available a scholarship of $200 for the training of another sight-saving class teacher at Cleveland, Ohio, this year. At present, three sight-saving classes are in operation with an enrollment of 45 students, and the Service understands that the Memphis sight-saving class, which was discontinued in September, 1940, is to be re-opened this month.

"During this period 57 persons, 48 being children and nine being adults, had varying amounts of sight restored to them in one or both eyes, either by glasses alone, by surgery, or by surgery and glasses. One other adult has had a cataract operation on one eye to restore sight and a needling operation on the other, both being successful, but no report has, as yet, been received on him as to the amount of vision restored.

"Also, during this period total or partial blindness in one or both eyes, either has been or is being prevented to 28 persons, 21 being

children and seven being adults. Seven children are having bilateral blindness from amblyopia exanopsia prevented, one child has had bilateral blindness from secondary glaucoma prevented by an iridectomy and a transfixion operation on the iris and one child may be having bilateral blindness from progressive myopia prevented by glasses, proper medical care and enrollment in a sight-saving class. Eleven children are having partial blindness in one eye from amblyopia exanopsia prevented and one child may be having blindness in one eye prevented from congenital optic atrophy. Five adults have had bilateral blindness prevented, three being from pterygia by surgery, one being from entropion by surgery and one from diabetic cataract by treatment for her diabetes, which is well under control. Two adults are having unilateral blindness prevented, one from amblyopia exanopsia by glasses and the other from sympathetic disease by the enucleation of the injured eye.

"During this period seven talks, six being on the causes of blindness prevalent in the state and their prevention and one being on the need for sight-saving class education in Tennessee, have been made by the Director of the Service, two being made before groups of senior medical students at Vanderbilt University, one before a Parent-Teacher group at Lewisburg, one before the Kiwanis Club at Franklin, one before the Forum Club at Old Hickory, one before the Lions Club of Lafayette, and one before a Special Education group at the University of Tennessee at Knoxville. Approximately 310 persons were reached by these talks. Following the talks at Franklin and Lafayette, the Kiwanis Club and the Lafayette Lions Club have begun co-operative programs with the Sight Conservation Service in the prevention of blindness and restoration of sight to visually handicapped children of Williamson and Macon Counties."

—*Sight Conservation Service, State Department of Public Health, Nashville, Tennessee*

Washington

"This District of the Lions Club is sponsoring legislation in co-operation with the State Department of Education and the Division for the Blind in order to make possible sight-saving equipment, consisting of adjustable desks, clear type books, bulletin typewriters, etc., which can be made available to schools in smaller towns and rural areas when there is not a sufficient number of pupils in the school to warrant the establishment of a sight-saving class. The equipment will be handled on a loan basis by the State Department of Education.

"The Division for the Blind in the State of Washington considers

this an important piece of legislation since it has been found very difficult to arrange transportation and housing for children in the smaller schools so that they can be brought to a central area and thereby have the benefit of a sight-saving class."

—*Division for the Blind, Department of Social Security, Olympia, Washington*

Hawaii

"*Causes of Blindness Study.*—Grace C. Hamman, director, Bureau of Sight Conservation and Work with the Blind, in collaboration with William John Holmes, M.D., ophthalmologist, has completed a study of the causes of blindness on 340 out of 379 known blind persons in the Territory of Hawaii. This study has been accepted by the American Medical Association for publication in the *Archives of Ophthalmology.*

"*Vision Testing and Medical Follow-up of School Children in Hawaii.*—The Bureau of Sight Conservation and Work with the Blind has the responsibility of the vision-testing program in the schools of the Territory. This activity is carried on by the County Field Workers in sight conservation.

"The policy is to have every child in any school or kindergarten given an annual visual acuity and muscle test and to have every teacher participate in this testing program.

"The field workers hold faculty meetings each September in each school and at this time demonstrate the techniques of the vision testing. The field worker stays in the school to assist and supervise the rough screening. She retests all questionable cases and all persons wearing eye-glasses and any cases whom the teachers refer. After testing is completed, referrals are sent to the families requesting medical eye care on questionable cases.

"The fifteen ophthalmologists of the Territory co-operate in using the eye examination blank which is approved by the National Society for the Prevention of Blindness.

"The field worker's duty after the testing is completed is to make arrangements so that every child referred has adequate medical attention. For the school year 1939–1940, 50,757 children came under this program. There was a total of 3,251 visual defects; 2,914 were referred to eye physicians. The difference of these two numbers is that cases of totally blind eyes by accident or artificial eyes are not referred yearly. Of this number, 2,429 received medical eye follow-up and there are on file the signed examination papers of 2,409 cases.

"We feel that this program is the key-note of our prevention of blindness activities.

"In co-operation with the Federal Social Security Department,

who allots funds to the Territorial Board of Health, the Bureau of Sight Conservation and Work with the Blind have had 144 eye operations for strabismus, ptosis and cataract during the last three years under Services to Crippled Children.

"The territorial definition of a crippled child includes these types of eye defects.

"*Eye Clinics in Hawaii.*—For the school year 1940–1941 the Bureau has completed nine eye clinics held in communities where the regular services of an ophthalmologist are not available. The field worker for each county organizes and supervises these clinics. They are usually held immediately following the vision-testing program in the public schools."

—Bureau of Sight Conservation and Work with the Blind, Honolulu, Hawaii

Note and Comment

Society's Program during the National Conference of Social Work, June 1–7.—The Society is again pleased to announce its participation in the National Conference of Social Work. The Society will maintain an exhibit and conference booth, and expects to have an opportunity of arranging consultation for any visiting social worker interested in any aspect of prevention of blindness or sight conservation work. Following is the program:

National Society for the Prevention of Blindness, Inc.

ASSOCIATE GROUP, NATIONAL CONFERENCE OF SOCIAL WORK
ATLANTIC CITY, NEW JERSEY
JUNE 1–7, 1941

General Chairman: ELLEN POTTER, M.D., Director of Medicine, New Jersey Department of Institutions and Agencies

Vice-Chairman: MARCELLA S. COHEN, Supervisor, Prevention of Blindness Department, Pittsburgh Branch, Pennsylvania Association for the Blind

Secretary: ELIZABETH G. GARDINER, Medical Social Worker, National Society for the Prevention of Blindness

MONDAY, JUNE 2, AT 2 P.M.

Helping America by Saving Sight in Childhood

Through Health Services

Roger E. Heering, M.D., Director, District No. 1, United States Public Health Service, New York, N. Y.

Through Child Welfare Services

Helen Hubbell, Supervisor, Rural Child Welfare Unit, Pennsylvania Department of Welfare, Harrisburg, Pa.

Through Educational Services

Mrs. Winifred Hathaway, Associate Director, National Society for the Prevention of Blindness, New York, N. Y.

Through Integration of Services

Theodate Soule, Director, Social Service Department, New York Hospital, New York, N. Y.

Discussion

(If time permits)

TUESDAY, JUNE 3, AT 7:30 A.M.

Breakfast

(Place to be announced)

Open only to medical social workers in eye services

THURSDAY, JUNE 5, AT 2 P.M.

Helping America by Saving Sight in Young Adults

Through Selective Service

Arno Town, M.D., Examining Ophthalmologist, Draft Board, New York, N. Y.

Through Industry

Charles F. Kutscher, M.D., Chief Consulting Ophthalmologist, Carnegie-Illinois Steel Corporation, Pittsburgh, Pa.

Through Social Services

Mrs. Ophelia Settle Egypt, Instructor and Field Work Supervisor, Division of Social Work, Howard University, Washington, D. C.

Discussion

Preventive Ophthalmology in Eire.—Miss Euphan Maxwell's very interesting address to the Irish Ophthalmological Society reveals the status of the prevention of blindness movement in Ireland following the foundation of the National Council for the Blind in 1921 and its prevention of blindness committee five years later. Ophthalmia neonatorum has been reportable in Dublin since 1928, but the trend in this direction has not as yet become country-wide. She pleads for the organization of special classes for oral instruction in schools where there are numbers of "partially sighted" children.

Although children leave school in Eire at the age of 14 years, Miss Maxwell feels it might be possible to allow a child with progressive myopia to continue attending the medical inspections of his previous school until he has reached the "more stable age of 16 years." In 1939 a public health nurse was appointed in Clare for the treatment of trachoma patients under the supervision of the county ophthalmologist. She says that "if hygiene were introduced as a compulsory subject in all schools and means found for the prevention of overcrowding, succeeding generations would know it no more." With regard to eye accidents in industry, although there are no statutory requirements in Eire for the provision or use of protective devices, employers realize their moral responsibilities and conditions are improving. At the present time "sight-testing" of workers in factories is done only in the case of entrants under 16 years of age. Because of the high incidence of ocular complications in venereal diseases, the state grants 75 per cent of net expenditures on treatment to local authorities; there are nine centers for treatment in Ireland. At the time of writing, only five of the 64 hospitals in Eire had a social worker. In her final remarks, Miss Maxwell expresses a hope for state regulation for opticians which "would not only secure a universally high standard of efficiency, but would serve to maintain the honor and dignity of a body which forms one of medicine's most highly valued ancillary services."

The Place of Local Societies for Prevention of Blindness.— During the last annual meeting, the Society had the privilege of having as its presiding officer, vice-president Russell Tyson, who discussed at the meeting of the Board the subject of the place of local state societies for prevention of blindness. In addition to describing the broad and varied program of the Illinois Society for the Prevention of Blindness, of which Mr. Tyson is president, he said in part: "Speaking for the Illinois Society for the Prevention of Blindness, we consider ourselves primarily a demonstrating agency and that our job is to work with public agencies and gradually to incorporate into public programs projects which will eventually wipe out unnecessary blindness in any given state."

Among the activities of the Illinois Society described by Mr. Tyson were the following topics: "Baby Work," "School Work,"

"Trachoma Work," "Glaucoma Work," and "Accidental Blindness."

The Red Cross and Conservation of Vision.—The Fourth Pan-American Red Cross Conference took place in Santiago, Chile, December 5–14, 1940. We note with interest that "the campaign against trachoma, the prevention of blindness and aid to the blind" are cited under the Health and Social Assistance Section in the Agenda of the meeting.

Fourth of July Fireworks Accidents in 1940.—Fireworks injuries resulting from the celebration of the Fourth of July in 1940 totaled 4,462, according to a summary published in *The Journal of the American Medical Association* on December 28, 1940. These included 214 serious eye accidents, 15 of which resulted in blindness in one or both eyes. There were eight deaths directly resulting from the use of fireworks and other explosives. The report is compiled from newspaper clippings and questionnaires sent to hospitals, but many injuries are unrecorded; the statistics do not include accidents treated in physicians' offices or in hospitals which failed to report.

"The effectiveness of adequate state legislation in reducing the toll of fireworks injuries has been demonstrated again," *The Journal* of the A.M.A. comments. "With the exception of most of the Southern states, which do not celebrate the Fourth of July extensively with fireworks, there are few exceptions to the rule that only those states which have enacted and enforced state-wide laws have shown evidence of satisfactory control. The injuries and deaths still resulting from this unnecessary cause clearly illustrate the need for additional legislation and consistent enforcement."

New York, as in most of the preceding years, headed all other states in the number of fireworks injuries in 1940, the figure being 1,114; and 32 of these were major eye accidents, four of which resulted in the loss of vision of one or both eyes. A great improvement in New York for 1941 is anticipated, however, because of the state ban on fireworks which is now effective.

Rhode Island had the worst fireworks record of any state in 1940

on the basis of population. It had 239 injuries, including three serious eye accidents.

The need for stricter enforcement of the anti-fireworks law in New Jersey is obvious from the fact that this state, one of the first to adopt such legislation, has shown a steady rise in the number of Fourth of July injuries during the past four years. A total of 158 injuries, including eight serious eye accidents, was reported last year.

On the other hand, Indiana showed a great improvement when its law against fireworks went into effect for the first time last year. There were only two injuries reported in 1940 as against 198 in 1939. The record of Indiana, in the matter of Independence Day injuries and deaths, has changed from one of the worst to one of the best.

Maryland has had a repeatedly bad record but has not yet enacted satisfactory legislation; there were 211 injuries reported from that small state in 1940, including nine serious eye accidents.

Pilot Fitness, A Safety Factor in Aviation.—Pointing out the fact that the need for testing the fitness of pilots for flying has been overshadowed by the development of instruments and the stress laid upon them as a guide for flying, Ferree and Rand describe, in a recent issue of the *British Journal of Ophthalmology*, a new instrument that permits sensitive tests of pilot fitness. This instrument, which they call an electrical multiple-exposure tachistoscope, was designed particularly for measuring the speed of adjustment of the eyes for change of distance, speed of accommodation and adaptation, and for testing ocular and general fatigue. In addition to its clinical applications, the authors point out that the instrument may be used as: (1) a test of vocational fitness in all cases in which dynamic speed of vision is an important requirement; (2) a test of pilot fitness for aviation; (3) a specific performance test of fitness for night flying; (4) a test of disturbance in fitness due to altitude; (5) a limiting test for age as a factor in fitness; (6) a means of measuring ocular fatigue and recovery, of testing individual susceptibility to fatigue and capacity to recover, and of detecting disturbances in fitness from other causes such as loss of sleep, worry and all mental

states that distract attention, etc.; and (7) as a means of training eyes to greater oculomotor and accommodative facility.

Louis Resnick.—We announce with sorrow the death, on March 18, of the Society's industrial relations director, Louis Resnick, who was a member of the staff since 1922, except for a period of several years when he was on a leave of absence to serve as the first director of the Informational Service of the Social Security Board and as public relations consultant to the International Labor Office. By a rising vote the following resolution was adopted by the Executive Committee of the Society for the records:

"The National Society for the Prevention of Blindness, in executive session on this eighteenth day of March, 1941, learns with sorrow and with a deep sense of loss of the death of Louis Resnick, a member of the staff of the Society for nineteen years.

"Mr. Resnick joined the Society as Publicity Director in 1922. Through his wide experience as reporter, editor and publicity director of many organizations he was able to make the activities of the National Society for the Prevention of Blindness known, not only throughout the United States, but in other countries. In 1928, because of his growing interest in and his thorough knowledge of industrial welfare, he was appointed Industrial Relations Director.

"For some time Mr. Resnick was on leave of absence for government service, but kept in close touch with the National Society and later returned for active work. In 1924 he revised 'Eye Hazards in Industrial Occupations,' bringing the material up to date and adding much new subject matter; during the past year he was engaged in rewriting the publication, which is now ready for the press.

"Louis Resnick was a man of vision. His keen mind was ever on the alert to discern new trends. He was recognized as an authority in publicity, editorial and industrial work. He arranged and took part in many conferences. His articles and editorials appeared in a vast number of newspapers and magazines. He was an indefatigable worker, never sparing his time or his talents. His life was one of service to humanity and its influence will reach out into the future.

"It is resolved that this memorial be spread on the minutes of the Executive Committee meeting and that copies be sent to his devoted wife and family."

Current Articles of Interest

Treatment of Inclusion Conjunctivitis with Sulfanilamide, Phillips Thygeson, M.D., *Archives of Ophthalmology*, February, 1941, published monthly by the American Medical Association, 535 North Dearborn Street, Chicago, Illinois. Dr. Thygeson reports in this article on the results of sulfanilamide therapy with cases of inclusion conjunctivitis in infants and adults, as well as in cases of the experimental disease in baboons. He first cites treatment of four baboons with the condition, treatment having been instituted within one week after the onset of the disease. The conjunctiva returned to normal within two weeks in two of the animals, and in the other two all inflammation disappeared, although follicles still persisted at the end of the period of treatment. Four adults—two having predominant follicular hypertrophy and two having a more severe condition and showing predominant papillary hypertrophy—responded satisfactorily to the therapy, discharge and inflammatory signs disappearing rapidly and follicular hypertrophy more gradually. The disease responded even more strikingly and rapidly in infants and healed within two weeks; in 70 per cent of the cases there was no subsequent recurrence.

Sulfanilamide therapy produced a striking effect on the microscopic picture of the disease. In all cases the inclusion bodies could be demonstrated without difficulty during the first and second days of treatment, but were either reduced sharply in numbers or absent on the third day and could in no case be found after the third day. The number of leukocytes in relation to the number of epithelial cells rapidly diminished until, by the fifth or sixth day, scrapings contained almost no cells except epithelial cells. Although inclusion conjunctivitis is only rarely complicated by secondary bacterial infection, in three cases where Staphylococcus aureus was present, sulfanilamide seemed to exert an inhibitory effect on the colonies.

In an effort to obtain data on the effect of sulfanilamide on the virus, baboons were inoculated at intervals with material from four patients under treatment. The author found that material taken on the second day of treatment, when numerous inclusions could

still be demonstrated, failed to infect baboons in two of three instances. On the other hand, material from two patients produced infection in baboons on the fifth and sixth days of therapy respectively, at a time when inclusions could no longer be demonstrated in epithelial scrapings. The author feels that, although the experiments were too few to permit conclusions to be drawn, the findings would confirm the opinion that the baboon inoculation test is more sensitive than the microscopic one for determining the presence of the condition.

Dr. Thygeson treated two infants locally with a saturated solution of sulfanilamide in physiological salt solution. Although no effect was obtained in the first case, its use in the second case every fifteen minutes during the day and every hour during the night for seven days was temporarily beneficial. He suggests that further experimentation with other preparations that would obtain a more prolonged action of the drug would seem to be in order.

A Survey of Superficial Punctate Keratitis in Tasmania with the Record of a Mild Epidemic, J. Bruce Hamilton, M.D., *British Journal of Ophthalmology*, January, 1941, published monthly by the British Journal of Ophthalmology, Ltd., London, England. Dr. Hamilton reviews his findings from 92 cases of superficial punctate keratitis culled from 6,662 consecutive case records—a case incidence of 1.38 per cent. The condition is caused by a virus infection of the trigeminal nerve, and Dr. Hamilton believes the same virus is responsible for multiple corneal erosions, marginal keratitis, dendritic ulcer, and disciform keratitis. Superficial punctate keratitis is more common in males than in females, and, although in this epidemic there seemed to be no seasonable variations, Dr. Hamilton did note that the disease was often accompanied by respiratory tract infections. Although the disease is transmissible, in this epidemic it did not appear to be infectious; in only two instances was an immediate relationship found between the patients, and that was slight. There seemed to be no acquired immunity; of the 25 patients who had attacks in both eyes, six appeared simultaneously, but in another nine there was an average interval of 78 days, ranging from two days to 18 months. Sixteen patients had a relapse in the same eye after an interval of from three days to four years.

Bilateral infection seems much more frequent in Tasmania than in other parts of the world, Dr. Hamilton found from a review of other series of case reports. He cites as associated conditions in this epidemic the following: marginal keratitis, the most frequent of the allied conditions; corneal ulcerations; dendritic ulceration; Neisserian iritis; phlyctens—which he believes are not a manifestation of the disease under review, but a separate concurrent lesion; folds in Descemet's membrane; hordeolum; herpes facialis; conjunctivitis and warts of the lid.

Dr. Hamilton states that the severity of the disease in Tasmania has been such as to prevent the patients from continuing their occupations on account of lacrimation and pain. Formerly the use of mild drops and lotions was employed, but, by painting the conjunctival surface of the lids with two per cent silver nitrate, the average duration of treatment has been reduced from 26 days to 7.3 days. He also found that, if a final application of the silver nitrate is made to the lids after the corneal lesions disappeared, relapses were diminished. The use of vitamin A therapy is also suggested.

The final visual results of this epidemic were determined in only 45 cases and in five of these there was mild deterioration of vision. Dr. Hamilton concludes, however, that superficial punctate keratitis does not appear to have any relation at all to the causes of blindness in Tasmania, either directly or indirectly.

Book Reviews

Real Living: A Health Workbook for Boys in Senior High Schools. Ross L. Allen, Dr.P.H. Book II. New York: A. S. Barnes & Co., 1939. 68 p.

As stated in the introduction, Book II of *Real Living* deals primarily with community hygiene and is an application to community living of the individual health problems met in Book I, plus other matters of great interest to high school boys. In explaining the use of the book, the author speaks directly to the boys. This fact, under the guidance of a wise teacher, might immediately be used as a means of inspiring the members of the class to make this study the basis for what might become a very valuable reference book.

Although not arranged on the unit plan as such, the topics are grouped so that the teacher could easily adapt them to the unit plan if called upon to do so. Each topic is prefaced by an introductory talk. Each of these, while informative in itself, leaves enough unexplained to cause the inquiring minds of high school boys, particularly those who are interested in science, to seek further explanation in some of the suggested readings for each topic.

Dr. Ross strikes at the heart of community hygiene through his immediate attack on the problem of communicable diseases, their cause, means of transmission, their control and prevention. His advice on the selection of a family doctor is timely and of great importance to these young people as they approach the age of assuming responsibility in community life as heads of families.

The subject of "Preparation for Marriage" is particularly well presented, and in cities where sex hygiene is included in the course of study, should do much to raise the ideals and standards of the young people. The topic is prefaced by a short study of the endocrine glands and their part in the regulation of body functioning. As presented by the author, sex hygiene is a frank discussion of how nature prepares both boy and girl for the physical and physiological needs of marriage, and of the problems that young people

must learn to meet and solve intelligently, if they are to live a happy, healthful and helpful life.

The chapters on safety are well chosen for high school boys, many of whom step directly from school into industry. The knowledge of traffic and industrial hazards as presented is a definite step toward prevention of such accidents. As a follow-up to highway safety, Dr. Ross presents a chapter on alcohol and tobacco. Here again the study is timely for the boy who is so soon to take his place in a man's world.

As in practically all courses in hygiene, more material is presented than can possibly be covered in the allotted time. However, this type of workbook allows for choice of material to meet the needs of the group.

Perhaps because hygiene, both personal and community, touches human life so closely, much depends upon the teacher, his background, his training, his attitudes. While there is danger that a workbook of this sort might become a prop for the inefficient teacher, *Real Living*, in the hands of a wise, understanding, teacher-counselor, should become a force in the training of future citizens for community living.

—Gertrude W. Syme

Text-Book of Ophthalmology. Sir W. Stewart Duke-Elder. Volume III. Diseases of the Inner Eye. St. Louis: C. V. Mosby Co., 1941. 3470 p. ill.

To write a criticism of the third volume of Sir W. Stewart Duke-Elder's Text-Book of Ophthalmology, entitled "Diseases of the Inner Eye," would be a sacrilege and to present a true appreciation of this monumental work in the allotted space an impossibility.

This volume is a remarkable source of information. It modernizes the literature on pathology and bacteriology in a clear and concise manner.

The illustrations represent the best in English and American literature. The pathologic illustrations credited to Parsons are especially valuable.

This splendid volume provides another milestone in the progress of ophthalmology. When the fourth volume is published, ophthal-

mology will have a remarkably complete treatise on the subject, including an excellent compilation of the literature.

—CONRAD BERENS, M.D.

SAFETY PROGRAMS AND ACTIVITIES FOR ELEMENTARY AND JUNIOR HIGH SCHOOLS. Florence S. Hyde and Ruth Slown. Second Revision Edition. Chicago: Beckley-Cardy Company, 1938. 269 p.

The success of this book is indicated in the fact that this edition is the second revision. As the name implies, this book is designed for the use of elementary and junior high teachers as a source book and for teaching suggestions. The material can be used when safety is taught as a separate subject or when it is integrated with other subjects.

The book consists of three main parts: the organization of safety work in schools; programs for general exercises, safety club meetings, school assemblies and classroom discussions; and projects and accident facts. Safety clubs, councils, and patrols are included. There are also practical suggestions for safeguarding children in various ways. Several plans are offered, so that any given school may adopt the organization best suited to its needs. It should be remembered, however, that less elaborate procedures are usually conducive to the best results. A maze of organization may involve the situation so that the primary purpose of a safety organization is lost to view.

The material for programs is presented by months. If used as suggestions, this type of organization is desirable. It is to be hoped that teachers will use the material in this way. Certainly, if transportation to and from school is a problem, it should be discussed when the problem arises and not be held off until February.

The third part of the book deals with accident facts and school and community projects. This material is presented so that any project refers to the accident facts. Teachers thus can see the relative importance of the topic. There is an excellent bibliography. It may have been helpful to include the price of the book and materials listed. One wonders, however, why certain of the newer series of supplementary materials have been omitted from the lists—by the American Book Company, for instance.

In general, the materials of this book are positive. Just what part

negative presentation should play in safety education has not been determined. Negative suggestions are given in the pictures on pages 77 and 98, and in such statements: "I do not play with candles or lamps," p. 77.

The reviewer would raise the question, "Of what value are slogans in safety teaching?" If the slogan is the point of emphasis, there will be little change of behavior or attitude. If children write their own jingles or slogans from the background of rich experience, the slogan may be useful.

In the early days of health and safety education, there was much emphasis on safety songs and poems. Many classics were distorted to teach safety. Experience has shown that such activities are relatively ineffective in changing behavior for safety. Poems and songs written with other thought in mind should be permitted to remain classics. Safety education should develop its own field of literature.

Each person who plans safety programs for a school should have easy access to this book.

—Mary May Wyman

Briefer Comment

The Perception of Light. W. D. Wright, D.Sc. London and Glasgow: Blackie & Son Limited, 1938. 100 p.

This volume is of special interest to physicists, physiologists, physicians, lighting engineers, road-builders, and public utility and municipal officials. It is based on lectures given by the author at the Imperial College of Science and Technology, and gives a fully illustrated account of many quite recent investigations, some of which have revealed new facts of essential importance.

The contents deal with the relation of illumination and vision to industrial and driving efficiency and hazards. Salient points in visual phenomena are given that are of greatest importance to those concerned with lighting problems and physiological optics. General visual phenomena, vision at high and low intensities, glare, and visual sensations are among the subjects discussed, and the chapter on recent researches in the field is of special interest.

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

344. Rules for Glaucoma Patients, Committee on Glaucoma of the National Society for the Prevention of Blindness. 1 p. (50 cts. per C; $4 per M.) Consists of twelve rules for patients having glaucoma—for distribution by ophthalmologists to private patients and in eye clinics.

345. The Heritage Left by Dr. Park Lewis. A memorial publication in honor of Dr. Park Lewis, consisting of the following papers: 1. Dr. Park Lewis as an Ophthalmologist, Eliott B. Hague, M.D.; 2. As an Internationalist, Lewis H. Carris; 3. As a Founder of the Lay Movement for Prevention of Blindness, Ellice M. Alger, M.D.; 4. As a Friend of Humanity, Charles Pascal Franchot. 20 p. Supplement to Vol. X, No. 4, of the SIGHT-SAVING REVIEW, December, 1940.

346. Protection of Eyesight and National Defense, Mason H. Bigelow. 4 p. ($1 per C; $7.50 per M.) Points out that protection of eyesight is vital to national service, as well as an important economic and social necessity.

347. The Problem of Sight Conservation as Related to the General Program of School Organization, Richard S. French. 8 p. 5 cts. Enumerates some of the responsibilities for sight conservation which face the school.

348. Functional Lighting in the College, John O. Kraehenbuehl. 20 p. 15 cts. Illustrated discussion of lighting for college students, including a sound analysis of the "pros" and "cons" of fluorescent lighting as it is today.

349. Facts and Factors in the Prevention of Blindness Program, C. Edith Kerby. 8 p. 5 cts. Presents the subject of blindness; the prevalence of defective vision; the larger aspects of conservation of vision; and on whom rests the responsibility of preventing blindness and saving sight.

350. The Effect of Vision on Reading Ability, Brittain Ford Payne, M.D. 8 p. 5 cts. Discusses a study of 42 cases of reading disability and the effect on this group of corrective lenses and orthoptic exercises.

D141. Sharing Responsibility for Eye Health, Winifred Hathaway. 8 p. 5 cts. Discusses the teacher's share in discovering visual defects and for taking the steps necessary for correction. Reprinted from the *Elementary English Review*, December, 1940.

D142. Good Eyes for Everyone, Mary Halton, M.D. 2 p. (50 cts. per C; $4 per M.) Emphasizes the need for protecting the sight during the critical growing years. Reprinted from *Parents' Magazine*, March, 1941.

Contributors to This Issue

Mason H. Bigelow, the newly elected president of the National Society, is associated with the law firm of Gould and Wilkie in New York City.

In addition to being superintendent of the California School for the Blind and lecturer in education at the University of California, **Richard S. French** has been president of the Northern California Council for Sight Conservation since 1937.

John O. Kraehenbuehl is professor of electrical engineering at the University of Illinois, Urbana.

C. Edith Kerby is the Society's statistician, and a member of the Committee on Statistics of the Blind.

Eleanor W. Mumford is the associate for nursing activities at the National Society.

Book reviewers: **Gertrude W. Syme** is teacher of health education at Girls' High School, Brooklyn, New York; **Conrad Berens, M.D.,** is director of the Department of Ophthalmology at New York University; **Mary May Wyman** is director of health and safety education for the Louisville, Kentucky, public schools.

Helping America by Saving Sight in Childhood—Through Child Welfare Services*

Helen C. Hubbell

THE author describes the sight conservation activities of the Child Welfare Service in Pennsylvania, under the Social Security Act.

IN A PAPER having to do with saving sight it may be permissible to present the "vision" difficulties which have been a part of the development of Child Welfare Services in Pennsylvania, and to see how these are related to the problem of impaired vision in individual children. The needs of all children call for sensitivity and imagination in those individuals who seek to give help; by the same token a program established in the name of service to children needs to be rooted in sensitivity and imagination, and in addition to have a clear-eyed vision as to what its focus shall be.

As this group is undoubtedly familiar with the section of the Social Security Act (Title V, Section 521) under which Child Welfare Services are available for every state, the only emphasis needed is a reminder that there is no general program for the country as a whole, but instead the freedom to work out with the United States Children's Bureau a plan best suited to the situation in each state.

A component of this freedom seems to me to be a responsibility to focus on services to children in terms of: (1) the greatest need in a particular state; and (2) the framework of government in the state within which the need can be met, since this is a public program. It is around this matter of focus that our program has had "vision" difficulties which have a direct bearing on what Child

* Presented at the National Conference of Social Work, June 2, 1941.

Welfare Services have meant to particular children with partial sight.

The group of children we saw clearly as needing our program were those in rural counties and areas of special need, who have to be cared for away from their own homes and whose maintenance (board, clothing and medical care) are the responsibility of the three County Commissioners, local public officials elected every four years. Therefore, we have used the federal money to place social workers with training and experience in those counties which would accept them and in which there was no child-caring agency with professionally trained staff. At the present time there are 19 such counties, 16 of them 50 per cent rural or more, and three considered as "areas of special need."

Therefore, on one bright morning a county child welfare secretary finds herself in an office in the Court House getting acquainted with her three "bosses" who may be graduates of the eighth grade or of a university—who may be men with business experience or the "professional" politician whose concept of public service is to be reelected every four years for the rest of his life on a platform of economy and reduced taxation. This is not facetiousness but a reality which affects the social vision of the Child Welfare Secretary, which in turn may mean physical vision or lack of it for an individual child.

The Child Welfare Secretary begins with a case load of children which at this point are a list of names on the county comptroller's book. We speak of these as an "inherited" case load, inherited from the days when the public officials did their own placing; they have been placed with people who would take them for the least amount or possibly free, which usually means that the child pays for himself through exploitation of either himself as a person or through his work-worth to the family; they may be in children's homes outside the county with no visits for years; they may be in institutions for the handicapped, including the blind, which may explain why there are partially sighted children in state institutions for the blind. In this inherited case load the outstanding characteristic is a lack of focus on the needs of each child which has meant a haphazard placement with the emphasis on money.

Our focus has been on the group of children in terms of finding

out where they are, why they are there, and what new plan should be made. Taking the three counties in which we have given the most help with partially sighted children, Fayette, Indiana, and Washington, the beginning case loads were 74, 48, and 64 respectively.

While the workers in these counties were in the process of discovering these "forgotten" children, there began a series of conferences on the state level between the Council for the Blind and the Rural Child Welfare Unit which is the administrative unit for Child Welfare Services on the state level, and both the Council and the Unit are Divisions of the State Department of Welfare.

In December, 1938, the Council asked for assistance from the Unit with these groups of children:

"(1) The first group consisted of blind children of preschool age for whom aid was needed, either through the education of the family to the end that the child might be brought up as normally as possible at home, or in the case of children whose home conditions were unfavorable, their referral for possible admission to the Arthur Sunshine Home and Nursery School for the Blind, Summit, New Jersey.

"(2) The second group was made up of blind children of school age whose mental capacity would not permit them to fit into the program of academic instruction at our two schools for the blind, but for whom habit training and the teaching of handwork might make life a much more comfortable and acceptable thing in later years, both for the children and for their families or those with whom they may live.

"(3) The third group was made up of children whose vision was above the level of blindness but below that which would permit their education under a plan set up for normally sighted children. In this group also were children suffering from conditions which if untreated might lead to later blindness."

This raised a problem with the Unit which is ever present; namely, what is the function of Child Welfare Services, and does help to these three groups of children come within it. From what has been said before about "inherited" case loads and "forgotten" children it is clear that the placement and supervision of children already in the care of the county was our first responsibility. We included also the study of family situations referred because of the conditions in the home and the question as to whether case work

with the family might help maintain the home. Therefore, the case loads in all three counties included both groups, but the chief emphasis was on the children away from home.

Granted that a child away from his home represents to some degree the failure of the community to provide a service which will strengthen family relationships and develop parent responsibility, once the children are placed, the agency responsible for their supervision *assumes, as it seems to me, a degree of responsibility which is greater than anything in the profession of social work.* Child placing involves separation from own parents, with all that means to the child and his parents, and the providing of a new experience in family life for the *child as a whole person.* A harassed, burdened, and often hectic child welfare worker brings little help to a fearful child living through a new experience, and unless she is secure in the knowledge of what her agency can and cannot offer, there is little security for the children for whom her agency takes responsibility. This is a fundamental conviction of the Rural Child Welfare Unit and out of this went the following statement to the Council for the Blind:

"It seems to me that the first and second groups of children given in your memorandum call for a program of care based on their handicap, whether they are in their own homes or elsewhere, and I see no place in our program for planning for these children as a *group.* However, in any of the counties where Child Welfare Services are established, should an individual child belonging to either of these two groups *need care away from his own home* as a neglected and dependent child, and a foster home would seem a helpful plan, such a child should be referred to the County Secretary for her decision as to whether she could take him into care. In such instances, I would assume the help in education needed by both child and foster mother would be secured through the Council for the Blind.

"In relation to the third group, I think I feel a little more responsible as their handicap is not enough to place them in the regular program for the blind. Here again, however, I think our criterion has to be whether or not the child needs care away from his own home. In the counties where we have Child Welfare Services I believe any child who might be helped by a foster home placement either because of his family setting or for an opportunity for better education or training should be referred to the County Secretary.

"My thinking is that our program can bring help to children who

are blind or whose vision 'is below that which would permit their education under a plan set up for normally sighted children' only if what we have to offer, namely thoughtful and planful care away from their own homes, is something the child can use in working out his acceptance of himself with his handicap or when our care would mean opportunity for special education or for medical and health care. It seems to me that there might be more children in group three who could use our service, than in group one and two."

This statement was accepted by the Council. Prior to this defining of a relationship between the two agencies on the state level, the Council and the Unit, there had already been some work on cases in two of the counties.

> In Fayette, Cecil was referred to Child Welfare Services with the request that he be visited at the George Junior Republic to see if he was receiving the right kind of education for his visual handicap. At this time Cecil was fourteen with an I.Q. of 79. An ophthalmological examination on July 30, 1936, showed "more vision than would require his education at a school for the blind." Glasses were secured. Cecil had been in institutions all of his life and he had been sent to the George Junior Republic because he was too much of a behavior problem to remain at the Western Pennsylvania School for the Blind. With the opening of Child Welfare Services in this county in December, 1936, it was hoped that Cecil might be removed from the George Junior Republic and placed in a foster home in Pittsburgh, with support from Fayette County, in order to attend a sight-saving class, and possibly go to the Child Guidance Clinic there. Change in workers and many problems of administration crowded Cecil out. Foster home finding for children with handicaps of behavior or sight, or both, was difficult, and impossible in Cecil's case at that stage of development of the Child Welfare Services program. An appeal to a child placing agency in a large city was unsuccessful and Cecil was removed from the George Junior Republic to the Torrence State Hospital for observation on January 7, 1939, and is still there.

This raises the question of whether Child Welfare Services in this particular county had anything to offer at the time Cecil needed our kind of help and whether there was anything real in our promise to help.

In Indiana County, where Child Welfare Services began in May,

1937, the case of Angelo M. was referred to the Child Welfare Secretary:

> Angelo, a fifteen-year-old boy living with his father in a taproom, was excluded from a township school because he was too "mentally handicapped for education in the public schools" (statement of School Board). In July, 1935, he had been examined by the psychologist from the Bureau of Mental Health in the Department of Welfare and found to be an "Albino with defective vision." This psychologist asked the Child Welfare Secretary to help Angelo's family with plans for his training. A part of the problem was Angelo's unwillingness to wear his glasses regularly and the father's lack of interest in helping with this. The Child Welfare Secretary reported no need for foster home placement because of the family situation and no sight-saving classes in the county. She asked for suggestions as to an institution where he "could be trained to save his vision and where he could be instructed vocationally." She agreed to visit and try to keep track of the glasses situation, as she found them broken on her visit to the home. The Council's reply to this was a suggestion that Angelo remain in his home with application made for his admission to Polk State Institution for the feebleminded, since his I. Q. of 62 did not justify placement in another county where a sight-saving class would be available. Plans were made for Angelo's commitment to the state institution for the feebleminded and an attempt made to secure the father's signature. This was unsuccessful and the father asked the Child Welfare Secretary "to drop everything." This was reported to the Bureau of Mental Health, but not to the Council for the Blind.

These two situations were handled through correspondence between the Council for the Blind and the Child Welfare Secretary. About this time, Mrs. English of the Council began having conferences with the field supervisor of the counties to which cases were being referred and carbons of letters to the counties were exchanged between the Council and the Unit.

In June, 1938, the Council invited the Supervisor of the Unit to speak to a group of four workers who had just completed a semester's training course in Medical Social Eye Work at Washington University, St. Louis. Each of these workers was to go into a county to develop a program for the prevention of blindness. Three other workers already in counties were there too. The meet-

ing gave an opportunity to present the program of child care—or lack of one—in each of these seven counties. In November of the same year, the director of the Council spoke at a staff meeting of the Child Welfare Secretaries from the nine counties in which the program was established. Points emphasized included:

(1) The Council's need to know of people with impaired vision so that treatment may be secured in time to prevent blindness;
(2) The need to know the various causes of blindness for the purpose of study and research;
(3) The special importance of discovering preschool children with vision difficulties so as to secure treatment and training;
(4) The use of qualified ophthalmologist with which the Council can give definite help.

About this same time the Council prepared the statement for the Unit which described:

(1) Recommendation to use an ophthalmologist if possible, and as a second choice an eye, ear, nose and throat physician;
(2) The types of defective vision which can be corrected with glasses;
(3) A definition of the partially seeing child;
(4) The acute eye conditions in children which may lead to blindness;
(5) The definition of a blind child;
(6) Special problems of the preschool blind child;
(7) A description of sight-saving class equipment.

Attached was a list by counties of certified ophthalmologists. This material was sent to all the counties, and became a part of the "travelling kit" of each field supervisor (sample of material available).

At this point it is interesting to see whether the working relationship that has been developing between the Council for the Blind, and the Rural Child Welfare Unit (both on the state level) has brought help to an individual child. You will remember that the Unit felt that Child Welfare Services might be most helpful to the group of children "whose vision was above the level of blindness, but below that which would permit their education under a plan set up for normally sighted children, and also those children suffering from conditions which, if untreated, might lead to later

blindness." First of all, there might be some of these children already in a county's case load and planning for these children with the help of the material furnished and the consultation service available to our field supervisors from the Council, would mean planning for these children on the basis of knowledge and special understanding. The emphasis on the use of a qualified ophthalmologist alone would give the county worker strength to demand this from the local public official, even at greater cost to the county; failing in that she would appeal to her committee of local citizens for special funds. It would be clear to the worker too that placement away from home, with the co-operation of the parents, would come within the function of the Services, even though it was to be made on the basis of a physical handicap. Her own "near-sightedness" in thinking of placement in terms of neglect and dependency would be helped. At least she would think through carefully whether or not she could take in this added responsibility without neglect of the children already in care, who are her first responsibility. She would have an experience in learning the resources for such children for medical treatment, the right kind of psychological examination and opportunities for education and training. It is of help to a county worker, beset with heavy case load and referrals that often bear no relation to the service which her agency has to offer, to know that procedures have been established on the state level between her "heads" and those of the agency (in this case, the Council for the Blind) from which comes a request for additional work.

She knows that the Unit follows the volume of work in each county through monthly statistics; that there is an attempt to define Child Welfare Services in each county; that there is an attempt to meet increasing volume with an increase in staff; that she is asked to help with plans for a blind or partially-sighted child because she has a definite contribution to make to such a child.

These points are borne out in the following case in Washington County:

> In March, 1938, Gloria C., aged 8, was referred by a private agency to the Council because of keratitis and the need of treatment for syphilis. With the help of the state nurse tests were made showing a 4 plus Wassermann, and the family was

advised to take Gloria to the clinic for treatment. This presented a financial problem to the family and there was some question of referral of the case to the County Commissioners for cost of transportation and treatment. At this point a friend volunteered transportation and the local eye physician took some responsibility for following along with the program of the treatment. In April Child Welfare Service began and the case was discussed by Mrs. English of the Council with the field supervisor for that county, and later by her with the Child Welfare Secretary. A visit was made to the home and Gloria was found to be improved. This family proved to be adequate so there was no need of placement. Inquiry of the physician brought the recommendation for treatment to continue for twelve to eighteen months longer. In conference with the field supervisor it was decided that the Child Welfare Secretary would continue to visit Gloria to see that treatment continued and to follow through with school placement which might require sight-saving equipment as there was no sight-saving class in the county. Gloria showed sufficient improvement to attend the regular school and except for special seating no other adjustment has been used.

The Child Welfare Secretary has done nothing spectacular in this case, but it is significant to me as Supervisor of the Unit on two counts: (1) real responsibility was taken for accepting this child as a part of the worker's case load which meant a following through as a part of her regular job; and (2) the plan of the field supervisor in helping her accept that responsibility due, I believe, to the understanding relationship between the two agencies on the state level. This working relationship is not static and should develop and change as both agencies have experience with what has already been developed.

Writing this paper has raised for me further points in our relationship which need to be clarified. However, there is a sense of direction in our work with the Council and I believe that this reaches through to the workers in the counties and helps them take responsibility for having a "sense of direction" in their work with individual children.

At this point, I would like to express the Unit's appreciation to the Council for initiating conferences through which our respective programs might be clarified and procedure for a working relation-

ship developed. A new public program for children and one financed by federal funds has many birth pangs, chief of which is the pain of defining its service. The general concept of public service means coverage, unlimited case loads, and insufficient staff. This may be a public agency, but it is not a child-caring agency in its real meaning. Taking children into care and under supervision can and does, in some instances, mean nothing better for the children, unless there is a defining of service and a sense of direction in each responsibility undertaken. Without this it is a kind of activity which makes us seem better than we really are. The experience of the Unit with the Council challenges us not to do all that is asked of us, but to select what is within our power and skill to give, and to do what is undertaken with the kind of responsibility which may make the difference between sight and blindness for an individual child.

With a developing relationship between the Council and the Unit we are increasingly aware that the Council's service is a specialized one in which we can share with safety to the children involved, in proportion to our own increasing knowledge in that field. We have had to learn how essential it is to use accredited ophthalmologists for all our children and this in itself may have saved the sight of children already in our care. We have learned how to work with teachers in providing sight-saving equipment and even in the simple matter of right seating for children with partial sight. This sharing in a specialized knowledge and experience is of value to all of the county workers whether they have yet had a particular child for whom they had to plan in terms of sight-saving. Since this kind of knowledge has more meaning when related to a particular child, we welcome the experience of using it for those children referred to us by the Council.

It is interesting that none of the six counties in which there is a prevention of blindness worker is there a program of Child Welfare Service, which suggests that we shall continue to be asked to give our help on cases.

In closing, I should like to emphasize the value in having the Council and Unit working together through exchange of memoranda and through conferences between field staff. Against this as a background, the Child Welfare Secretary in each county can

decide what her agency can offer in individual cases referred by the Council. She has to measure the degree of responsibility she can assume in relation to the function of her agency and the volume of work already undertaken. She has the responsibility for adequate budget, which should include provision for proper lighting facilities as well as correct and adequate nutrition. Today, more than ever, the vital importance of nutrition in creating and maintaining eye health is recognized. In any case she has a clearer understanding of the eye needs of all children and of the specialized needs of those children whose vision must be conserved.

The questions of interest to the group might be: (1) How to make sure that all the children in the care of Child Welfare Services receive adequate eye examinations and care; (2) Should we respond to all referrals from the Council no matter how hard pressed with our own job? (3) Is our program in rural counties the answer to the needs of children needing care and sight-saving provisions at home and at school? What is the goal for these children and whose responsibility is it to achieve that goal?

Helping America by Saving Sight in Childhood—Through Educational Service*

Winifred Hathaway

THE relation of social work to the sight-saving class program is described in this article, which presents three case histories describing the important role of the social service worker.

IN A RECENT issue of the *Reader's Digest* the story is told of a little negro boy taking part in a race, but so far behind the others that there seemed little hope of his ever reaching the finishing line. Suddenly, however, he seemed to take a spurt and speeded up so rapidly that he crossed the line first. Bystanders noticed that his lips kept moving and asked him what he had been saying. "I was just a-prayin', 'O, Lord, you pick 'em up and I'll put 'em down; you pick 'em up and I'll put 'em down!' " Was there ever a more direct or a more efficient prayer? You do your part and I'll do mine. This is education—all those concerned in the welfare of the child doing their part so thoroughly that he is enabled to do his part equally well, and thus, through a co-operative effort, develop his innate powers to the full extent of their possibilities.

Modern education is founded on the proposition that the child is ready for the school and the school is ready for the child. How far this proposition is still theoretical rather than practical is shown by the many problems found in the schools of today. The school is more and more realizing that the child is not ready to take advantage of educational opportunities offered and is, therefore, reaching out to the preschool child.

But if the educational proposition, that the child is ready for the school, is to become an actuality, it is necessary to reach much

* Presented at the National Conference of Social Work, June 2, 1941.

further back. The social worker is one of the key people in this undertaking and must, therefore, assume a full share of the responsibility for premarital laws, prenatal, natal, postnatal and preschool care. If she carries out this program adequately, she has the right to ask of education the fulfillment of the second part of the proposition—that the school be ready for the child.

In order, however, to be able to do this intelligently, she must know present conditions and be able to give all possible assistance coming within her province toward solving the problems created by these conditions. She must, moreover, be in position to know what are the correct conditions toward which the school should strive, always bearing in mind, however, that an ideal is never static, but moves forward as new knowledge becomes available.

Importance of Vision in Education

It has long been recognized that impressions from the world outside the child reach his inner consciousness through his senses and that, of these, the sense of sight carries to the brain a far larger proportion of impressions than do all of the other senses combined. Modern education accentuates this use of the power of seeing. More close use of the eyes is required by the educational program of today than ever before. Other things being equal, any child who would compete with his fellows must either have as good sight as they, or must be given, in some form, compensation for his lack.

Responsibilities of the School System

In the schools of today, so far as vision is concerned, four groups of children must be considered:

1. Children with normal vision. The responsibility of the school system for this group is to make every effort to keep the vision normal through attention to general health and eye hygiene and to the correct physical equipment of the classroom, including correct lighting, seating, ventilation and the use of well printed textbooks.
2. Children with defects of vision that may be compensated for with glasses or diseases of the eye that may be successfully healed. Here the responsibility must, of course, include the benefits provided for the first group and, in addition, co-operation with the

parents in having the necessary correction or treatment that will bring the child's vision as near to normal as possible.

3. Children with serious eye difficulties who, after proper refraction and treatment, cannot be profitably educated in the regular grade.

4. Children who are blind or who have so little sight that their educational approach must be made through other senses, chiefly those of touch and hearing.

In addition to the care taken for the first two groups, special equipment and educational media suited to their needs must be provided for those in the third and fourth groups.

Responsibilities of the Social Worker

The social worker comes in contact with some of the individuals making up each of these groups. With those of the first group she has the opportunity, through home visits and through contact arising in clinics to which children may be brought because of conditions affecting general health, to stress eye care and protection, through attention to diet, prevention of accidents at play or in sports, and care of the eyes during the onslaught and particularly during the convalescent period of diseases of childhood—measles, whooping cough, etc.

The contact of the social worker with individuals of the second group is almost constant. There is the necessity for treatment of minor eye difficulties—sties, blepharitis, conjunctivitis, etc.—and for examination for refractive errors. The problem of obtaining glasses to compensate for these is ever with her. The emphasis on returning for reexamination or check and the follow-through are likewise parts of her job. What a social worker can accomplish in co-operation with others is demonstrated by Dr. Imus,* of the Dartmouth Eye Institute, in the following case:

> An 11-year-old boy in the seventh grade was not only having difficulty in reading but also presented an extreme behavior problem in school. On the latter account, a social worker was assigned to co-operate with the teachers and the family in an attempt to correct his emotional maladjustment. In reading, the child would lose his place, skip lines, or read the same line

* Imus, Henry A., "Visual Efficiency," appearing in the April and May, 1941, issues of *Hygeia*.

> twice; the words would become blurred. After an hour of study, his eyes would itch and burn, and he would feel sleepy. An eye examination revealed a moderate amount of far-sighted astigmatism and aniseikonia (unequal images in the two eyes). Following the proper correction of these disorders, he made a gradual improvement. Six months later his mother reported that, for the first time, he was enjoying his school work, and that his report card showed no failures and some A's and B's. She also stated that the improvement in his general behavior was as striking. There is no doubt that, in this case, the correction of the ocular condition helped to transform this child into a better integrated personality and a socially acceptable person.

The social worker's closest contact, however, is with the third group, made up of the partially seeing whose serious eye conditions not only call for continuous eye care, and attention to diseases of the body that may be the real cause of the eye difficulty, but also to the effect of home conditions on the physical and emotional life of the child. Maladjustment arising directly or indirectly from the handicap is a problem, the solution of which faces every social worker. In order to help in solving this, a social worker must understand some of the reactions that might be expected from refractive errors and other eye difficulties. A highly myopic child may develop a non-social attitude. If his difficulty is uncorrected, his focal distance is short; he cannot recognize things or persons beyond this point; hence, he tends to become interested only in nearby objects. This may result in his being self-centered and egotistic. The wise social worker will make every effort to widen his horizon by seeing that his difficulty is corrected and by interesting him in outdoor games that he can undertake.

The hyperopic child sees things better at a distance than those at close range. Eye tasks often prove irksome to him. His attention span is short, and if forced to do close eye work for any length of time he may become irritated and may even have tantrums. Again, correction is indicated and it may be necessary for a social worker to explain to the teacher why a considerable amount of oral work should be a part of his program.

The child with uncorrected astigmatism is under a constant strain because the ciliary muscle is trying to focus a clear image.

What the social worker may do in such case is indicated by the story of Anne:*

> Anne attended a private school of high standing. The teacher found that she had good background and experience, did excellent oral work, but was an exceedingly poor reader. The eye test indicated the need for a thorough ophthalmological examination and word to that effect was sent home to the parents. Although they were well educated people with ample means for good medical care, they did nothing and there was no follow-through on the part of the school.
>
> The next year the eye test showed a worse condition although, curiously enough, Anne's reading had improved considerably and some of her nervousness had disappeared. Again notice was sent home with the former results. A friend of the family, a trained medical social worker, was visiting the home and noticed that Anne was using only one eye in reading. She inquired about school records. Anne's mother told of the notices that had come two years in succession but stated that the child was so busy with extra-mural activities—dancing, swimming, tennis, etc.—that there had not been time for medical attention. The medical social worker tactfully arranged matters.
>
> A muscle imbalance was suspected, but it was found that one of Anne's eyes was so highly astigmatic that practically all letters blurred beyond recognition. Since the brain could not fuse the clear image from the good eye and the blurred image from the poor one, the latter gave up trying to function. Naturally, when only the clear image from the good eye was received, Anne's reading improved, but at the cost of a practically useless eye, and a loss in fusion and depth perception! Following the thorough medical examination it was possible to compensate for the astigmatism with glasses, but a long period of training was necessary to re-educate the astigmatic eye to work at all and then to work in co-operation with its fellow. The good eye had to be occluded in order to make the other assume its share of the seeing process.

The child with such seemingly insignificant difficulties as sties or blepharitis may be suffering from malnutrition, lack of sleep or refractive errors and may be listless, uninterested in school work and given to fits of crying. The social worker cannot hope to

* Hathaway, "Sharing Responsibility for Eye Health," *The Elementary English Review*, December, 1940.

effect an adjustment until the cause of the difficulty is found and eliminated.

The case of Esmeralda indicates what may be accomplished by the co-operation of teacher and social worker where both are vitally interested in the welfare of the child.*

> Esmeralda was a mirror writer and reader. Just as in taking a photograph the image is upside down on the film or plate and must be developed to bring it right side up, so the image on the retina, the picture-making film of the eye, is upside down and must, through some process of the brain, be reversed to its correct position. If this power is lacking in the brain little can be done; if it is present and its function is being interfered with by various influences, much can usually be accomplished. But what these influences are must be determined.
>
> Although for Esmeralda's teacher, mirror reading and writing were new experiences, she accepted her responsibility and made every effort to find out why the child held her book upside down and read from right to left and why she followed the same procedure in writing. An eye test showed no eye difficulty but the teacher realized that the child was in exceedingly rundown physical condition and was very nervous. Visits to the home showed that Esmeralda lived in an atmosphere of continued fear and apprehension because of the brutality of her father when he was intoxicated, and this was usually the case.
>
> The teacher immediately got in touch with a social agency equipped to take care of this problem. A thorough medical examination was arranged for and the suggestions of the doctors followed. A foster home was found for Esmeralda; her general health was built up through proper food and rest, and with the removal of the fear element, much of the child's nervousness disappeared. The teacher gave individual attention to her reading difficulties and gradually the child began to hold the book in the correct position. With the book right side up, the change in reading from left to right was made without too great effort. The writing problem was somewhat more difficult of solution; the change came very gradually and for some time if Esmeralda was hurried or flustered, she reverted to mirror writing.
>
> With the building up of the physical condition and with infinite patience on the part of the teacher, at the end of a two-year period the difficulty had entirely disappeared.

* *Ibid.*

In this case the teacher, realizing that there were problems connected with the reading difficulty that did not come within her province, acted as a contact between the family and the social agency equipped to undertake the necessary adjustment. By both assuming their share of the responsibility, they were influential in changing the child's life.

Education of the Partially Seeing

To the ophthalmologist belongs the responsibility for diagnosis and treatment of eye difficulties, but usually he has the added responsibility of recommending educational procedures and all too often a recommendation is made that a child be kept out of school because the ophthalmologist is unfamiliar with any form of special education that might be available in his community. If under such circumstances the social worker is able to acquaint him with the resources of the community for special education of the partially seeing, she will be serving not only the child but the community. If, on the other hand, no educational opportunities for such children are available in the community, she may bring the needs to the attention of the educational authorities and so, again, serve the child and the community.

In order to fulfil either of these obligations, the social worker must have a basic knowledge of the extent of the problem and the best methods of solving it.

Extent of the Problem

The number of partially seeing children (those having such serious eye conditions that special educational procedures are necessary) is comparatively small. The most conservative estimate is one in a thousand of the school population, although the results of practical experience indicate the ratio to be much nearer one in five hundred.

Partially seeing children come under the following classifications:*

1. Children having a visual acuity between 20/70 and 20/200 in the better eye, after refraction.

* Hathaway and McIntire, "Sight-Saving Classes: Organization and Administration," Publication 30, rev. 1937, National Society for the Prevention of Blindness, 1790 Broadway, New York, N. Y.

2. Children with progressive eye difficulties.
3. Children suffering from non-communicable diseases of the eye or diseases of the body that seriously affect vision.

During the past decade much attention has been given to the effect of eye difficulties on educational processes and to the psychological reactions of physical disabilities. As a result, it is well to consider the placement in a sight-saving class of the following three other groups of children as a temporary measure:

1. Children who have had eye operations (particularly enucleation) as a result of which re-adaptation in eye use or psychological readjustment is necessary.
2. Children who are suffering from muscle anomalies requiring re-education of the deviating eye in cases in which an untoward psychological reaction is manifested.
3. Children recovering from diseases such as measles, who need special eye care until they are able to assume the full responsibility of regular grade work.

Perhaps the best summary is, "Any child of normal mentality who, in the opinion of the ophthalmologist, needs the special care, equipment and educational media offered by sight-saving classes, should be considered a candidate."

Solution of the Problem

The best method yet devised for the education of such children is the establishment, in school systems, of special classes known as sight-saving or sight conservation classes. A community having approximately 10,000 pupils enrolled in the school system will, in all probability, have enough partially seeing children to warrant the establishment of a special class for them. There are now in the United States, 627 sight-saving classes in 220 cities, representing 28 states, the District of Columbia and the Territory of Hawaii. It is estimated that 40,000 additional boys and girls in the United States still need the facilities for special education.

The trend in modern education is against segregation; hence sight-saving classes are established on a co-operative or co-ordinating basis. The partially seeing child does all his school work requiring close use of the eyes in a specially equipped room under the direction of a teacher trained to understand his difficulties and to adapt

material to his eye needs. He carries on all other activities with his normally seeing companions.

Physical Set-Up of Sight-Saving Classrooms

Seeing is a complicated process involving the functioning of many factors, chiefly the eye through which to see, the light by which to see and the brain to interpret the message. Since in this group of children it is recognized that the eyes are unable to carry their full share of the load, it is essential, in the physical set-up, that special attention be paid to illumination.

For normally seeing eyes, a minimum of 15 foot-candles of illumination (units of light) is recommended. For eyes that deviate from the normal to any marked degree, the recommendation is double this minimum.* However, quality of illumination is an even more important factor than quantity. Light should be well diffused, well distributed, well directed and without glare. Many factors contribute to bringing about desirable results: orientation of the room, depending upon climatic conditions, unilateral natural lighting from the left of the pupils (since the great majority of children are right-handed), with special seating arrangements for the left-handed child. If bilateral lighting is desired or necessary, windows should be at the left and rear, those at the rear being placed at such a distance from the floor that children will not be sitting in their own shadows. The glass area should be at least twenty per cent of the floor area and should reach as near to the ceiling as possible, since the best light comes from the top.

Natural illumination should be adequately controlled by two translucent shades of soft-finished material, placed at or near the center of the window, one pulling up and the other down, with a protective device to prevent streaks of light from entering between rollers. Shades should be wide enough so that light will not enter at the sides.

Artificial illumination for dark days is as essential as good natural lighting. Luminaires should be selected with great care. Indirect fixtures, diffusing the light thrown on the ceiling, give com-

* Illuminating Engineering Society and the American Institute of Architects, "American Recommended Practice of School Lighting," New York, N. Y., 51 Madison Avenue, 1938. 60 p. 25 cts.

fortable results for seeing. Plastic bowls as nearly white as possible are sometimes preferred, for although the source of light is not visible, there is a luminous effect which is thought to aid psychologically. It is economical to place luminaires on separate switches with possibly higher wattage lamps in the row away from the windows.

In order to obtain the best results from illumination, ceilings should be white; upper walls should be light, giving above 50 per cent reflection value; lower walls may be darker. The color of walls is determined to some extent by the climate; in cold zones a warm buff is desirable; in torrid zones gray-greens or blues may be preferable. In the near future fluorescent lighting may prove most desirable for schools. Then the colors of walls will have to be considered in this connection. Walls, ceilings, woodwork and all furniture in the room should be in dull finish to prevent glare.

Equipment of Sight-Saving Classrooms

Sight-saving classes are equipped with movable, hygienic, adjustable seats and desks that lift to any desired angle so that material to be seen may be in correct eye focus. The desk tops may be pushed back and forth in order to obtain comfortable, individual distances.

Children in sight-saving classes are encouraged to place seats and desks, work tables, etc., in such position that no child faces the light or sits in his own shadow. It has been found that turning desks approximately 30 degrees away from the windows will prevent glare from the skyline and increase ease of seeing.

Black chalkboards are gradually giving place to those in light gray-green or deep buff; they are made of composition or special glass. On the former, white chalk gives an excellent contrast; on the latter a blue chalk which is now on the market may be used advantageously.

Typewriters in large type are part of the equipment and children are taught to use the touch system in order to reduce eye use to a minimum.

Educational Media

Sight-saving classes are provided with books in large type, globes and maps in distinct colors without detail, special paper, pencils

with heavy lead, large chalk and material for handwork that may be correlated with their academic programs and may also be used at home in order to take the place of close eye work.

The Sight-Saving Class Teacher

The most important consideration in the success of a sight-saving class is a well-trained teacher who understands the difficulties under which partially seeing pupils work, does everything in her power to help them meet these difficulties, but places emphasis on their possibilities rather than on their limitations.

Such teacher should have the basic educational training required for all teachers in the community. In addition, she should have taken intensive courses in anatomy, physiology and hygiene of the eye, common diseases of the eye and refraction, together with observation in eye clinics, and special education courses that will fit her to adapt school procedures to the needs of the child, as well as observation and practice in sight-saving classes. One of the essential qualifications of such teachers is good sight, since a very great amount of eye work will be required.

Educating the Partially Seeing Child in Rural Communities

For partially seeing children in rural schools or in communities too small to warrant the establishment of sight-saving classes, the problem of education is difficult but not impossible of solution. In some instances a class is established in a consolidated school. In others, pupils are sent to the nearest sight-saving class.

In cases in which no other arrangement can be made the rural school teacher may be provided with the necessary educational material. This provision should be made by the state or county board of education. It might be pertinent to draw again on the *Reader's Digest.* Aunt Becky was listening very carefully to a sermon during which the negro preacher mentioned all sorts of crimes from murder to shooting craps. Her agreement was shown by her loud "amen's" and "praise de Lawd!" However, when the preacher touched upon snuff-dipping the subject was a little too near home for Aunt Becky, and turning to her neighbor she said audibly, "Dar now! He's done stopped preachin' and gone to meddlin'!"

With the many new organizations formed it is a little difficult for the members of each to know exactly what the functions of the job are. Sometimes these are so overstepped that they certainly come under the head of meddling. To illustrate:

> In a city in which there were a number of children with seriously defective vision needing the advantages of a sight-saving class, the superintendent of schools was not very modern in his thinking. With great difficulty those who were interested finally persuaded him to put in an experimental class.
>
> A social service worker, who had not kept in touch with developments, decided to take the matter into her own hands; she went to a service club and asked if the members would be interested in having sight-saving classes established. They indicated considerable interest. She then went to other organizations and finally took the results of her labors to the superintendent of schools. He stated that he had been about to open a sight-saving class as an experiment, that preliminary arrangements had been made, but that since the service and other clubs were desirous of having sight-saving classes, he was perfectly willing that they should take the full responsibility, but that, of course, the class would not be established in the public schools. He indicated that if such class were the responsibility of the board of education, the social worker would naturally have talked with him before taking up the matter with the various organizations. It was not until a new superintendent was appointed that the establishment of a sight-saving class could be again taken up; all the preliminaries had to be gone over a second time.

It definitely is within the province of the department of public welfare to find these children and to recommend them for educational opportunities, and here the social worker has a very big responsibility. But it is essentially the rôle of the board of education to see that these opportunities are offered even though such board, having no resources of its own, may call on other organizations, public and private, for assistance.

The most successful undertaking for rural, partially seeing children for whom sight-saving classes cannot be provided, is in those states in which there is a special supervisor in the state department of education who sees that books are provided by the state library and who visits the schools and gives necessary help to the teacher in the use of material. It is the experience of those who have tried

out various plans that little, if anything, is accomplished by just providing books in large type, since this is likely to give a false sense of security. If there is no department of special education and no special supervisor, state or county supervisors of elementary education would do well to prepare themselves to give the necessary instruction and other help to rural teachers having such children in their communities. This would have a far-reaching effect in which the social worker would share, for the attention necessary for educational procedures in the case of the partially seeing child widens the horizon of the teacher and makes her conscious of the necessity for conserving the sight of all children; and in this undertaking she looks to the social worker as her ally.

Social workers coming in contact with partially seeing or with blind children have a definite responsibility toward possible restoration of sight through surgical or medical means. Many states are now including operations for cataract, ptosis and strabismus under the Crippled Children's Act. The social worker must often be the one to act as a liaison person to bring together the child presenting a need and those who can meet it.

> Emily had a chalazion on her eyelid—a kind of blind stye formed by the blocking of the oil glands in the lid. It was not serious and hardly noticeable. However, it troubled her mother; the neighbors, having little but advice to give, showered this upon her. Said one, "A man down the street will take that off in a jiffy." So down the street went Emily with her mother. He did take it off in a jiffy but unfortunately he took most of the eyelid with it, and Emily was left not only without protection against light, but she became the object of such curiosity that she soon refused to go to school and developed an anti-social attitude.
>
> A social worker visited the home one day before Emily had time to hide. She set herself to win the confidence of the child and, knowing resources, finally succeeded in getting Emily to an eye surgeon noted for plastic restorations. Not only was a new eyelid grafted into place, but even eyelashes were made possible. With a new eyelid and confidence restored, Emily has again taken her place in a social world. She is not quite sure whether she wants to be a plastic surgeon or a social worker. It is hard for her to decide because she realizes that both are necessary to the welfare of humanity.

Planning an Individual Reading Program For a Child in a Sight-Saving Class

Margaret Balch

MRS. BALCH emphasizes the need to adapt the reading program to the individual needs of the sight-saving class pupil.

Introduction

This is a preliminary study, the purpose of which is to develop a practical reading program to meet the general and the specific needs of children in a given sight-saving class. This class, operating under the co-operative plan, is made up of sixteen children in grades ranging from first through eighth. The study was planned to help the writer, first, in diagnosing the individual reading problems of the children in the class; second, in analyzing the ophthalmologist's report concerning each child, and in interpreting each report in terms of educational possibilities and limitations for that child; and third, in setting up a practical reading program for each child in the light of these analyses.

Such a study must, of necessity, rest upon the understanding of certain distinctions between the reading situation in the typical classroom and that in the sight-saving classroom. In the life of the typical child reading is not only the key subject for practically every other school subject, with the exception of such special subjects as art, physical education, and in some cases, music, but also the means by which the individual is expected to get a large proportion of his information as he goes through life. Furthermore, the school endeavors to give the child a lasting desire to read for pleasure and for recreation, thereby providing for him a leisure time activity which throughout his life will be an important means of enriching his cultural and informational background. Reading,

therefore, to the child with good vision becomes a means of acquiring information, understandings, and appreciations.

Reading in the life of the child with poor vision must serve a much narrower purpose. The child in a sight-saving class must be taught to read, but the amount of reading that he does must be limited. The length of time he devotes to reading is shortened in order to save his sight. Thus it seems reasonable to assume that scientific experiments which determine ways to economize time in reading or in learning to read should be of particular benefit in planning the reading program for him. Ideally, the time he uses his eyes in learning to read and in reading should give the maximum results.

Emphasis should be placed on good instructional procedures in any class. Of even greater importance are they to the sight-saving class. While good instructional teaching will minimize the amount of corrective work necessary, nevertheless there are certain factors entering into the situation in a sight-saving class which give rise to a definite need for a good remedial program. In the first place, all too frequently visual difficulties are not recognized until children have been in school for some time and have become reading failures. In the second place, social and emotional maladjustments are likely to be more common among children in a sight-saving group than among those in a typical group, and such maladjustments often lead to reading difficulties. In the third place, psychological factors may be the underlying reason for a child's experiencing difficulty in learning to read in spite of good instruction. For instance, some children do not have the phonetic sense that others do. Mirror writing and mirror reading, and reversal tendencies are strong in some children. Speech defects and slovenly speech habits, sometimes found among children of low vision, contribute to poor reading.

It is evident that a good reading program for any atypical group of children must embody the essential features of a good instructional program for typical children. Therefore the first part of this study is concerned with determining a good general plan for the teaching of reading at various levels, which is based upon recently developed techniques and practices, and upon studies, investigations, and experimental data which meet with the sanction of

recognized reading authorities of the day. In the second division of the study, an attempt has been made to modify this program for children with visual handicaps. A brief review of current educational writings concerned first with eye hygiene and reading, and second, with determining relationships between defective vision and reading abilities, comprises the third part of this study. The fourth problem taken up is the planning of special reading programs for a few children in the particular sight-saving class referred to at the beginning of this paper. These children, because of their eye conditions, require highly individualized reading programs.

Case studies are presented to illustrate how the ophthalmologist's report and the teacher's diagnosis of reading difficulties were used in formulating these individual reading plans.

The study will be concerned with reading in the elementary grades.

A Good Reading Program for Typical Children

So much has been written concerning good instructional reading programs, and the field is so broad, that we will attempt here only to outline the basis upon which one must build such a program.

The specific aims of reading for the stages of learning to read must be understood. Dr. Gray classifies these stages as "the period of rapid growth in fundamental attitudes, habits, and skills," and the "period of wide reading."* The first period mentioned here coincides with the primary grades and the second period with the intermediate grades.

Dr. Gray explains that "in the lower grades instruction ordinarily is focused on the development of such fundamental habits as: first, speed and accuracy in recognizing common words; second, ability to make an independent attack on new words; third, discontinuance of 'crutches,' such as pointing, the use of line markers, and vocalization; fourth, the establishment of correct eye-movement habits; and fifth, reasonable skill in using reading as a thought-getting process."*

The leading objectives for the upper grades are "growth in power

* Gray, William S., "The Nature and Types of Reading," *Thirty-sixth Yearbook;* Part One, the teaching of reading, a second report. National Society for the Study of Education. Bloomington, Illinois: Public School Publishing Company, 1937.

to comprehend, appreciate, and evaluate materials, and to use reading in pursuing other activities."*

In summarizing the opinions of the recognized reading experts, we may say that the reading program of the first three school years should build up proper attitudes towards reading; should provide a good sequential plan of instruction based on the interests and abilities of the children at various levels; should be guided by the maturation levels of the children; and should give children means of attacking new words, through phonetic clues, through recognition of parts of words, and through contextual clues. During this period correct directional movement should be established, comprehension of what is read should be cultivated, the ability to recall what is read should be developed. The entire program should be varied so that skill is acquired in reading different types of material and in reading for different purposes.

In the intermediate grades reading covers a wider range, and reading for specific purposes is stressed. More silent reading is done. There is emphasis on the "research" type of reading, requiring the use of the index and the dictionary. Children must learn ways to locate material quickly and to "skim" the page. Ability to read in several fields, such as the social studies, arithmetic, and the natural sciences, becomes necessary. Children should be taught to pick out what is important, to organize information, and to make intelligent application of what they read. Through reading at this stage the child broadens his knowledge, increases his understanding, and cultivates his appreciation.

A Good Reading Program for Children in a Sight-Saving Class

A good reading program for a sight-saving class will rest, first, upon the teacher's knowledge of good teaching practices to be used with normally sighted children; second, upon the teacher's versatility and facility in adapting materials and methods to the individual needs, particularly physiological needs, of the children in the class; third, upon the constant building up of background and concepts through purposeful activities other than the child's read-

* National Society for the Study of Education. "Report of the National Committee on Education." *Twenty-Fourth Yearbook*, Part One. Bloomington, Illinois: Public School Publishing Company, 1925.

ing in order to give richer meaning to what he does read; and fourth, upon a careful selection of reading materials, so that what the child reads not only meets the requirements of good eye hygiene, but is also of real interest and of educational value to him.

A point that must not be forgotten is that more than usual care must be taken to give a child with a serious visual handicap the best possible teaching of reading during his initial reading experiences. For the sake of economy of eye use, the best reading habits possible for him with his visual apparatus should be established during his first few years of reading.

As sight-saving class pupils use books printed in clear type, twenty-four-point print, some reading material is available at each reading level. It is assumed that sight-saving classrooms are correctly lighted and that the children in the class read in the sight-saving classroom. However, two definite restrictions must be made. In the first place, the length of time each child may read is limited because of his eye condition. In the second place, the amount of material available for him to read on any given subject is only a fractional part of that which is at the disposal of the child in the regular classroom. This is due in part to the expense of printing books in the clear type, twenty-four-point print, which limits the publisher to printing only that material which will be used throughout the entire country in sight-saving classes.

The child who is greatly restricted in the length of time he may read loses the beneficial effects on reading skills that are the direct results of reading a large amount of material. In stressing the value of extensive reading of material "unencumbered by word difficulties," Gates says, "If you would provide six, eight, ten, twelve times as much reading material as you now have for each unit assignment of new words, you will have taken a most important step in teaching pupils to read."*

By narrowing the variety of material he reads on a particular subject, we may deprive him of the richness and depth of understanding that come from reading material stated and presented in diversified ways. The sight-saving class teacher should see that

* Gates, Arthur I., "Needed Research in Elementary School Reading," *Fourth Annual Research Bulletin*, National Conference on Research in Elementary School English, February, 1936.

these limitations are compensated for as adequately as possible. There are several ways of doing this.

The two most universally and most frequently used means of meeting the problem of meager reading material for particular lesson assignments are having the necessary material read aloud to the children, or having it typed on the special typewriter used in the sight-saving class. With this help the child can have his work coincide with that of the child in the regular class, and he is prepared to take part in the daily recitations and discussions in the regular classroom.

Care must be taken to have only as much typed material as is absolutely necessary to enable the child to follow the daily work being done in the regular class. The sight-saving class teacher must use good judgment in regulating the amount of typed material read by the children. Only typed material of real educational value should be used.

Frequently good clear-cut pictorial material can quickly and with a minimum of eye use give the child more exact information than he might gain by reading several pages. Pictures, graphs, and posters, well chosen, may be used to advantage.

While well-planned trips and excursions are of unquestioned educational value for all children, they are of special significance for partially seeing children. They provide means of broadening interests and of gaining accurate information. They give opportunities to learn through seeing, hearing, feeling, and even smelling, sense experiences too seldom incorporated into our educational programs. They also serve to substitute learning through direct experience for the vicarious experiences of reading. They are ideal media for giving the child with poor vision new information, clearer understanding of social relationships or of natural phenomena. Through these direct experiences the child builds up a vocabulary which has real meaning to him. These experiences that build background for intelligent reading are possible without close eye work.

Many of the same advantages may be gained in meeting, talking with, or in being given informal talks by people whose hobbies, experiences, or work is such that they have worth-while information or inspirational material for the children.

It is believed that a child reads more rapidly and with greater ease material concerning things he knows about if it is written in language understood by him. Therefore it seems logical to believe that a more thorough introduction than is necessary for typical children to reading in a new field would be advisable for children with eye difficulties.

A good program of oral language work is a splendid means of developing abilities that contribute to reading efficiency. The effectiveness of oral language work and also of building up a background was demonstrated by Miss Peck in a study of the reading ability of visually handicapped children. She showed that improvement in reading resulted after special attention was given to oral language and to increased reading to children at school, at home, and during library story hours.*

The radio, the talking book, and the dictaphone, all of which are valuable in sight-saving classes, are used to provide the children with defective vision with much that other children get through reading. These machines are all excellent substitutes for reading, and also serve as a means of improving reading.

We have mentioned here only a few of the devices for building backgrounds and vocabularies and for keeping the reading program filled with life and interest. We believe that any means of making reading interesting and understandable to the child makes it easier for him to read and therefore taxes his eyes less than material that is neither interesting nor understandable to him.

Adapting the Reading Program to Individual Needs

The reading of some children in a sight-saving class can be adequately provided for through their class reading experiences. By this phrase is meant those experiences which are planned for the members of one grade level in the sight-saving class. Such a group usually consists of from two to five children. Their program will follow the lines of a good reading plan for partially sighted children. Such a plan should include group reading, individual reading, silent reading, audience reading, reading of many different types of material, and reading for various purposes. No matter

* Peck, Olive S., "Reading Ability of Sight-Saving Class Pupils in Cleveland, Ohio," SIGHT-SAVING REVIEW, Vol. III, Number 2, June, 1933.

how flexible the general reading plan is, there will be some children whose eye conditions are such that highly individualized plans are necessary for them.

Case studies of a few of the children in one sight-saving class who required specialized reading programs are given here. They were made for the purpose of giving the writer as full and as clear a picture as possible of all the circumstances that might directly or indirectly influence the reading of these children. In each case the eye condition is the factor to be given prime consideration. The available data have been assembled and an attempt has been made to consider not only the physical and mental characteristics of each child, but his emotional, social, and personal problems as well, in planning for him a reading program that will avoid too great a tax on his eyes, but one that will promise constant and satisfying progress for him.

The grades given are as of June, 1940. A child listed in the third grade was completing his third grade at that time, because there are no mid-year promotions in this school system.

As large-type standard reading tests were not available, standard reading tests for the regular classes were adapted and given in all grade levels in June, 1940. The results, of course, could not be considered valid. However, they did give the teacher definite indications of certain abilities and disabilities. For this reason the teacher's estimate has been used in rating the child's reading ability.

Betts' Ready to Read Tests were given to some of the children in 1939. The results are given for those children who took the test.

Taken as a whole, many of the data are incomplete. Certain information available for some of the children is not at the present time available for others. Yet in each case there is enough known to make a satisfactory diagnosis of the reading situation. The important phase of these case studies is the use made of the ophthalmologist's reports in determining definite teaching procedures.

Case Study: J. B.

Boy. Age 9. Grade 3. I. Q. 120.

Oculist's Report.—Vision without glasses: right eye, 8/200; left eye, 8/200. Vision with glasses: right eye, 20/200; left eye, 20/200.

Prescription: O.D. -8.00 -2.00×135.
O.S. -8.00 -4.00×130.

Medical diagnosis: Myopia complicated by nystagmus and amblyopia. Cause unknown, though probably hereditary, anatomical, or dietary.

Prognosis: May be capable of improvement.

Oculist's Comments: This child is very nearsighted. The difficulty is progressive and the etiology is unknown. He should use his eyes enough to meet your educational problems under the sight-saving program, but not for extra reading problems. Diet of vitamins A, B, and D and hygienic home environment, if possible, are indicated.

Betts' Visual Sensation and Perception Tests.—Distance fusion—failed; visual efficiency—two eyes—60 per cent; left eye—0 per cent; right eye—60 per cent; vertical imbalance—failed; coordination level—failed; lateral imbalance—failed; reading distance fusion—failed.

Home Conditions.—Good comfortable home in outlying district with plenty of room to play and roam through the woods. Finances difficult. Father has been ill and unemployed. Mother works. Parents' attitude toward child and his visual difficulty very good.

Teacher's Estimate of Reading Ability.—Good average reading for grade level; speed, slow; word recognition, fair. Word attack is not good through phonetic approach. Boy appears nervous and annoyed when an unrecognized word delays his progress and in the resulting confusion he wastes time before really attacking the word. This is especially true if he is reading aloud before other children.

Comprehension of what is read, very good; recall, very good; application and using information gained through reading, excellent.

Related Difficulty: In writing J. B. frequently reverses letters, especially in short words.

Child's Attitude Towards Reading: J. B. did not like to read and frequently suggested other things to do. In the last year he has begun to enjoy reading.

Abilities of child that should be utilized: Excellent understanding of arithmetic; excellent understanding of social studies; ability in art work (especially poster-making); interest in what is going on in the world; broad vocabulary.

Pertinent History: This boy is quite conscious of the fact that he is a year older than most of the children in his class. When he was six years old he entered a regular first grade class in another city where there was no sight-saving class. He used the same materials as the other first grade children, and though he liked to play with very small toys, he did not learn to read from the small print books. He developed temper tantrums, mischievous tendencies, and a sensitiveness about his inability to read. He used many devices to cover up the fact that he could not read. Having a sister a few years older who is very bright and who learned to read easily added to his self-consciousness.

He entered the sight-saving class the following fall and began first grade again. He found himself in a sight-saving class with two other children who were quite inferior to him mentally. As his reading advanced much more rapidly than did theirs, he overcame his habits of avoiding reading and of pretending to be reading stories that he could not read. His mastery of mechanics of reading progressed normally, though his reading vocabulary did not build up as quickly as might be expected from his intelligence and his age.

In the second grade a little girl who was about a year and a half younger, but an excellent reader, entered the class. J. B. reverted to some of his previous devices for appearing to be more capable than he was. While the situation was recognized by the teacher and various means of coping with it were attempted, the problem remained in the boy's mind. It is possible that his confusion when presented with unrecognized words is related to this.

When he entered the third grade, a second little girl of outstanding ability entered the sight-saving class. The problem for J. B. was further augmented. Fortunately he surpassed both girls in arithmetic, which compensated in a measure. Though competition and comparison of abilities were avoided by the teacher, the boy is intelligent enough to face reality and make his own comparisons, and what he finds annoys him.

Teacher's Diagnosis: J. B.'s reading difficulties are probably largely due to physical and emotional factors. This boy, who is intellectually capable of a high standard of accomplishment, is hampered by physical limitations. The slowness of reading and the

reversals are probably due to his nystagmic condition. Because his eyes tire quickly, his reading periods must be short. However, being eager to go ahead more rapidly and excel, he is constantly building up unfortunate emotional reactions to his own reading, which is slow and unsatisfactory for him.

Suggested Reading Program for J. B.: The two conditions that must be adjusted to are, first, low vision complicated by nystagmus, and, second, the child's own emotional reactions. It is likely that the eye condition will not ever improve. The boy will probably always have very poor vision and also the constant movement of the eyes known as nystagmus. These conditions will influence what he will be able to do all his life; and must be kept in mind in planning any program for him. As these conditions may be considered unalterable, the program must be adapted to them as a permanent factor. On the other hand, the changing of the emotional reactions is desirable and must be an end in view in planning the program.

Prognosis.—J. B.

If this boy's myopia does not progress further and if family finances permit, he should be able to go through high school and do some college work. Knowledge of family conditions, however, indicate that he will attend school through high school. He should be able to enter an occupation that requires intelligence and a high school education, but a minimum of eye work.

Program.—The program recommended consists of the following:

1. The length of time J. B. is allowed to read should be quite restricted—possibly to 45 minutes a day.
2. Reading activities should be scattered throughout the day.
3. Reading activities should be varied (some book work, blackboard work, etc.).
4. Oral reading that gives him prestige would be good. (Reading to younger children stories or information that is of interest to them but too difficult for them to read.)
5. More than the usual amount of reading should be done for this boy. It should be done by the teacher, a reader, the parents, and older sister.
6. J. B. should be encouraged to use as many ways as possible to gain information without using his eyes for close work (radio,

trips, meeting and talking with interesting people, the talking book, and the dictaphone).

7. He should be helped to develop along the lines in which he shows ability, namely: arithmetic, art, and social understandings. Possibly the art and social study fields would be the wiser choices. Creative work along these lines should be provided for. Making sand table projects, large paintings or friezes, and posters, especially those of value in integrating his social understandings, would not only be developing his abilities, but would be providing excellent emotional outlets as well.

8. J. B. should be given frequent opportunities to share the results of his work with the children with whom he works in his regular class. Oral reports, art work, or project material can be used.

9. Emotional training is needed. If this boy could learn to accept his eye condition, he would probably gain emotional stability, and begin to feel greater satisfaction in all his school work. Satisfaction in his reading might improve the quality of his reading.

10. Close contact with the home should enable the teacher and the parents to work together for wholesome personality and emotional growth in the child.

11. A thorough explanation of the program should be made to the teacher of the regular class in which J. B. works, and to his parents.

This may sound like too broad an educational plan to be popularly called a reading program. It is, however, a program that should give this boy many of the educational advantages that other children gain directly from reading. In that sense we choose to call it a reading program.

Bibliography

Betts, E. A. *The Prevention and Correction of Reading Difficulties.* New York: Row, Peterson, 1936.

Clark, Brant. "The Effect of Binocular Imbalance on the Behavior of the Eyes During Reading." *Journal of Educational Psychology.* Vol. 26, October, 1935.

Crider, Blake. "Certain Visual Functions in Relation to Reading Disabilities." *Elementary School Journal.* Vol. 35, December, 1924.

Davis, L. F. "Case Histories of Children Presenting Visual Difficulties of a Functional Nature." *Peabody Journal of Education.* Vol. 17, November, 1939.

Davis, Louise Farwell. "Teaching of Reading to the Visually Handicapped Child." *Peabody Journal of Education.* Vol. 16, November, 1938.

Eames, T. H. "Ocular Conditions of Three Hundred Fifty Poor Readers." *Educational Research.* Vol. 32, September, 1938.

Eames, T. H. "Restrictions of the Visual Field as Handicaps of Learning." *Journal of Educational Research.* Vol. 29, February, 1936.

Eames, T. H. "Study of Incidence of Eye Defects and Sex Among Poor Readers." *Journal of Educational Research.* Vol. 33, October, 1939.

Farris, L. P. "Visual Defects as Factors Influencing Achievement in Reading." *California Journal of Secondary Education.* Vol. 10, October, 1934.

Fendrick, Paul. *Visual Characteristics of Poor Readers.* (Contributions to Education No. 656) New York: Teachers College, Columbia University, 1935.

Ferree, C. E., and Rand, Gertrude. "Lighting and the Hygiene of the Eye." *Archives of Ophthalmology.* Vol. 2, July, 1929.

Gates, Arthur I. "Needed Research in Elementary School Reading." *Fourth Annual Research Bulletin,* National Conference on Research in Elementary School English. February, 1936.

Good, G. H. "Relation of Fusion Weakness to Reading Disability." *Journal of Experimental Education.* Vol. 8, September, 1939.

Gray, William S. "The Nature and Types of Reading." *Thirty-sixth Yearbook;* Part One; the teaching of reading, second report. National Society for the Study of Education. Bloomington, Illinois: Public School Publishing Company, 1937.

Gray, W. S. "Selected References on Elementary School Instruction: Reading." *Elementary School Journal.* Vol. 40, October, 1939.

Imus, H. A., Rothney, J. W., and Bear, R. M. *An Evaluation of Visual Factors in Reading.* Hanover: Dartmouth College Publications, 1938.

National Education Association—Department of Elementary School Principals. "Newer Practices in Reading in the Elementary School." *Seventeenth Yearbook:* Vol. 17, Washington, D. C., July, 1938.

National Society for the Study of Education. "Report of the National Committee on Education." *Twenty-Fourth Yearbook,*

Part One. Bloomington, Illinois: Public School Publishing Company, 1925.

Peck, Olive S. "Reading Ability of Sight-Saving Class Pupils in Cleveland, Ohio." *The Sight-Saving Review*, Vol. III, June, 1933.

Southall, J. P. C. *Introduction to Physiological Optics*. New York: Oxford University Press, 1937.

Spache, George. "The Role of Visual Defects in Spelling and Reading Disabilities." *American Journal of Orthopsychiatry*. Vol. 10, April, 1940.

Stromberg, Eleroy L. "Relationship of Measures of Visual Acuity and Ametropia to Reading Speed." *Journal of Applied Psychology*. Vol. 22, February, 1938.

Tinker, Miles A. "Illumination Intensities for Reading." *Sight-Saving Review*, Vol. 6, March, 1936.

Tinker, Miles A. "Motor Efficiency of the Eye as a Factor in Reading." *Journal of Educational Psychology*. Vol. 29, March, 1938.

Vernon, M. D. *Visual Perception*. New York: Macmillan Co., 1937.

Witty, P. A., and Kopel, D. "Heterophoria and Reading Disability." *Journal of Educational Research*. Vol. 29, February, 1936.

Witty, P. A., and Kopel, D. "Factors Associated With the Etiology of Reading Disability." *Journal of Educational Research*, Vol. 29, February, 1936.

Eye Protection Experience in Mining Operations*

R. H. Seip

FIFTEEN years of a program of eye conservation in this mining industry indicates healthy progress with a marked increase in the number of employees co-operating by wearing goggles continuously.

THE program of eye protection and the policy governing it which are presented in this paper make no claim for 100 per cent protection or for the complete elimination of eye injuries. They are presented, rather, as a guide to a sensible and workable program that should obtain the co-operation and support of the employees.

The protection of the eyes of employees has been a part of the accident prevention program of the New Jersey Zinc Company since 1912. The use of safety goggles always has been advocated and goggles always have been supplied without cost to the employee. Prior to 1930, at which time a full-time Safety Division was created, no specific standards for goggles had been established, and no definite requirements for their use had been made.

In the period from 1926 to 1930 goggles of various styles and makes were tried in order to determine those best suited to our conditions and to our employees. Improvements were made rapidly by manufacturers in this period, not only in styles of frames for various purposes, but in the character and quality of the glass lenses. From the viewpoint of the employee, comfort was most important. The frames of the closed type of goggles were made to be form-fitting, while the old nose bridge of the spectacle type

* Presented at the Twelfth Annual Safety Convention of the Greater New York Safety Council, April 23, 1941.

was replaced by adjustable nose pads such as are used on high grade corrective glasses. The change from a round lens to the "tear-drop" shape with the raising of the temples to the "ful-vue" position overcame many other objections by the employees. A distinct advance was made also in the standardization of lenses for protection against harmful light and heat rays.

The result of these experiments was the adoption of goggles of all types produced by one manufacturer. This decision was based not only on the products themselves, but also on the fact that such adoption would reduce to a minimum the number of styles and types of goggles to be carried in stock, as well as the quantity of repair parts that would be required. Another result of this standardization was a definite change in the attitude of employees toward the more general use of goggles. At this time no specific requirements had been set up, but greater emphasis was placed on recommendations to the employees that goggles be worn where hazards existed.

Coincident with this step was the campaign for the reporting and treatment of all injuries, regardless of their nature. Consequently there was an increase in the number of "eye cases" reported in 1930. In order that the progress of experience may be observed, the table on page 123 is interpolated.

The necessity of a more definite program for the conservation of vision was indicated in 1931 when the statistics of the first cycle of periodic physical examinations of all employees disclosed the fact that the physical defect involving the greatest number of employees was that of vision. In the examinations vision was not recorded as defective unless the visual acuity was less than 20/40 in one or both eyes. The statistics showed that 17.1 per cent of the total number of employees examined (1,265) had some considerable degree of defective vision, either corrected or uncorrected.

Inasmuch as one of the primary purposes of the physical survey was to extend helpful advice to employees, particularly in cases where improvement could be made, the matter of defective vision was given first consideration.

Consequently, arrangements were made to have the visual acuity of the 17.1 per cent with defective vision checked by a competent medical specialist. This check-survey was conducted at the Frank-

lin Plant without cost to the employees. Subsequent to this check-survey each employee was notified of the findings in his case, and, of the 200 employees examined, 118 were advised to have a complete ophthalmological examination. No recommendation was made as to whom they should consult beyond urging them to have the examination made by a competent medical specialist.

Summary of Eye Injuries Causing Loss of Time, Franklin and Sterling Plants

	Franklin	*Sterling*	*Total*	*Shifts Lost*	*No. of Perm. Dis. Cases*
1926	11	3	14	252	2
1927	17	1	18	112	..
1928	10	0	10	207	4
1929	13	1	14	436	6
1930	33	16	49	658	9
	84	21	105	1,665	21
The average number of employees for this period was 1,450.					
1931	15	14	29	172	3
1932	2	3	5	15	0
1933	7	1	8	30	1
1934	0	2	2	3	0
1935	1	3	4	35	1
	25	23	48	255	5
The average number of employees for this period was 1,120.					
1936	7	2	9	34	1
1937	3	1	4	17	1
1938	3	4	7	44	0
1939	4	0	4	10	1
1940	1	1	2	52	1
	18	8	26	157	4
The average number of employees for this period was 1,175.					
Grand Total	127	52	179	2,077	30

To comply with this recommendation it would have been necessary for employees to travel to some city with possible loss of time and wages. Such necessity was eliminated when arrangements were made with a competent medical specialist to make examinations at Franklin and to furnish prescriptions at a low cost of $5.00

to each employee examined. A similar arrangement was made with a reliable dispensing optician who made the necessary optical measurements and offered a selection of frames. The price of the finished glasses was dependent upon the style and quality of the frames selected, and the finished glasses were supplied to employees at slightly more than cost. The optician made a second trip to the plant to properly fit the glasses.

Of the 118 employees who were advised to have complete examinations made, 87 did so and obtained glasses. Among the remaining 31 were many who already had glasses, but of which fact the Company had no prior record. As a result of the program, the majority of the defective vision cases and the most serious of them were corrected.

The survey statistics also showed 63 employees with a visual acuity of 20/200 or less in one or both eyes. As this fraction is considered as industrial blindness, it was felt essential that adequate protection should be provided against injury which might affect the remaining vision. Accordingly, this group was required to wear safety goggles continuously while on duty. In cases where prescription goggles would correct the poor vision, safety goggles made to prescription were and are supplied to the employee without cost to him. The sole requirement is that the employee present a prescription from his doctor. Thirty-one of the 63 employees with visual acuity of 20/200 or less were supplied with prescription goggles, 25 with plain goggles, and seven were not required to wear safety goggles due to the nature of their work. Each member of this group was given a letter from the superintendent at the time his goggles were delivered to him, with definite instructions to wear the goggles continuously when on duty. A copy of this letter was placed in the employee's file in the Personnel Office.

The statistics of the second cycle of periodic physical examinations in 1935 disclosed a higher percentage of employees with defective vision—21.1 per cent as compared to 17.1 per cent in 1931. This figure included practically all of those examined in 1931 and there was almost no turnover of labor in the four-year period. Further analysis showed that, of the 239 employees with defective vision, 116 were corrected and 29 were tested for visual acuity by a specialist without recommendations for correction.

By this time the policy of the management relative to its eye conservation program was well established and it was felt to be unnecessary to bring an oculist and optician to the plant. Employees may consult them, however, and receive the same consideration in costs as in 1931. The employees have been most cooperative, and, during the eleven-year period from 1930 to 1940 inclusive, 241 have presented prescriptions and have been supplied with prescription spectacles.

Prescriptions normally received from oculists or optometrists rarely supply all of the necessary information and many carry only the lens prescription. Hence, it has been found helpful to provide the employee with a form on which the prescription and all necessary measurements may be entered. These measurements are most important to obtain the correct fit of the goggles.

The results of this program have been so satisfactory to both the management and to the employees that it has been and probably will be continued. Recommendations are made to employees to consult a medical eye specialist for examination. Many of them consult optometrists, however, and prescriptions from optometrists are accepted.

Coincident with the start of the medical part of the program in 1931, concentrated effort was directed to the accident prevention part of the program, with special emphasis on the elimination of eye injuries. The general results may be noted from a study of the table at the beginning of this report. It will be seen that, in the five-year period from 1926 to 1930 inclusive, there was a total of 105 cases of eye injury causing loss of time, and in 21 of these cases some degree of permanent disability resulted. In the next five-year period, from 1931 to 1935 inclusive, the total number of cases decreased to 48 with only five resulting in any permanent disability. A further reduction is shown in the next five-year period, from 1936 to 1940 inclusive. The total number of time-loss cases dropped to 26 and only four of these suffered any permanent disability. In the entire 15 years the total number of employees never has been less than 1,100.

In the eleven-year period from 1930 to 1940 inclusive there have been four cases resulting in the total loss of one eye. In two of these cases the use of goggles had been recommended for the type

of work being done, but were not worn at the time of the accident. In one case the use of goggles was not required and in the fourth case, in an accident in which the employee drilled into some explosive in a drill hole, the force of the resulting explosion was so great as to blow the lenses entirely out of the frames.

As has been stated, for many years safety goggles were supplied to employees with recommendations that they be worn when working under conditions that might be hazardous to the eyes. Compliance with these recommendations was left to the judgment of the employee, with the result that goggles were not worn to any great extent. In 1932 more rigid rules were placed in effect and were incorporated in printed booklets of Safety Standards which were given to all mine employees. These requirements were extended in a re-issue of the Safety Standards in 1936. In 1938 similar Safety Standards were printed for all departments except Mining. Specifications for the types of goggles to be worn on certain jobs were included.

For general underground work, each employee was supplied with goggles of the closed type with clear lenses. In cases where the continuous use of goggles was required the spectacle type was supplied. Mine employees are not required to wear the closed type continuously because of fogging due to temperature changes, perspiration, etc., and any restriction of vision, such as this would cause, is undesirable where illumination is limited. The closed type with elastic headband can be worn on the miner's hat and may be drawn down over the eyes. It was felt that more use would be made of the goggles if they were readily available than if spectacle goggles were supplied and carried or kept in clothing pockets. It has long been the opinion of the writer that the spectacle type is more desirable from the standpoint of comfort and ventilation and provides adequate protection from flying particles. The closed type of goggle is being gradually replaced by the spectacle type. Many employees wear them continuously. Others carry them, when not in use, in a canvas pouch attached to the belt.

The general types of goggles now in use are as follows:

> Closed type with ventilated side screens, clear 50 mm. glass lenses, and elastic headbands. These are gradually being replaced by the

Spectacle type with clear glass lenses set in "ful-vue" frames with nose pads. The 50 mm. type are gradually being replaced by goggles with 47 mm. lenses.

Spectacle type with tinted glass safety lenses for glare from furnaces or sunlight.

Spectacle type with safety lenses ground to prescription. 50 mm. lenses are not used to avoid exaggerated decentering of lenses.

Closed type with special colored lenses for protection from welding and cutting rays. (Goggles are not worn by electric welders. Welding helmets are worn for this type of work.)

Driver's type with tinted wide lenses for glare—not safety glass.

The trend away from the closed type to the spectacle type is definite, but has resulted in a more general continuous use of goggles throughout the mine and plant.

It has been the policy to supply goggles to employees without cost. They are expected to receive reasonable care, but are replaced when lost or damaged without argument. The cost of the goggles is borne by the department in which the employee works as a check against abuse of the policy.

In the eleven-year period from 1930 to 1940, goggles of various types have been supplied as follows:

Closed Type (Protective)	2,499
Closed Type (Welding)	104
Spectacle Type	1,839
Prescription	241
Sun Glasses	19
Total	4,702

The approximate cost of these goggles was $7,800. The loss of a single eye results in a cost of about $2,000. Thus, if only four eyes were saved during this period, the goggles have more than paid for themselves. There is ample evidence from many shattered lenses to prove that many more than four eyes have been saved from injury or total loss. In one specific case a mine employee was engaged in excavating a drainage ditch along the side of an underground drift which had been driven about 12 or 15 years before. He was wearing closed type goggles. He struck a projecting piece of rock with a sledge. An explosion followed as the result of the

detonation of some explosive which had been in an old lifter hole since the time the drift was driven. He suffered a compound fracture of the jaw, with numerous severe lacerations of the head, face, arms, and body. His eyes were uninjured although one lens of his goggles was blown out completely and the other badly shattered. Without goggles this employee, in all probability, would have been permanently and totally disabled. He is working at his normal occupation.

It has been our experience that the most of our disabling eye injuries have occurred when goggles were not worn where recommended or required, or on work where the use of goggles has not been required. In view of this fact an extension of the requirements for the use of goggles was contemplated several months ago. Such an extension could have been made simply, but without the cooperation of the employees it would not accomplish the desired result.

Consequently the employees were asked by the management to select certain of their members to meet informally with the Safety Division Chief for a discussion of the goggles program. No minutes were kept of these meetings and no employee's statement was quoted. The discussions were free and productive of many good suggestions. Some of the opinions expressed follow:

1. The men feel that there is a need for wearing goggles of some type for their own protection.
2. There is no objection to the use of goggles on jobs on which the use of them is required by the Company, where conditions, such as fogging, do not make their use hazardous.
3. Goggles are not worn to the extent they should be worn because it is somewhat of a nuisance to put them on for a moment or two for certain jobs.
4. Goggles are worn in proportion to the extent their use is enforced by their bosses.
5. Improvements should be made in fitting goggles to the individual—particularly the spectacle type.
6. A few opinions were expressed that the continuous use of goggles might cause eyestrain. They were assured that, due to the quality of the optical glass and the precision grinding of the lenses, no bad effects are probable.

7. The prescription goggles supplied by the Company are very satisfactory. It is probable that requests from men with defective vision will increase, due to the fact that, if they are going to use goggles more extensively, they may as well get properly fitted and wear them continuously.

As a result of these suggestions from the employees the Company policy on goggles will include the following items:

1. Continue the present educational program, stressing the advisability of wearing goggles.
2. Gradually extend the requirements for the use of goggles by increasing the jobs and places where goggles shall be worn. In this connection the particular hazards of the job should be indicated.
3. Improve the fit of goggles. This recommendation is now in operation. For several years each new employee, at the time of his employment, is impressed with the value of good vision. A demonstration of the strength of the lenses is made by driving a nail into a pine board with a pair of spectacle goggles as a hammer. This is effective. An attractive case containing several pairs of goggles with different bridge widths is used to obtain the correct size of bridge. A mirror in the case illustrates the various features which have been pointed out. This ceremony is impressive to the new employee.
4. Continue the policy of supplying employees with prescription goggles.

It is felt that the criticisms and suggestions which came out of the meetings with the employees will result beneficially. It is now apparent that there is a marked increase in the number of employees who are wearing goggles continuously. The experience of 15 years, as indicated by the figures in the table at the beginning of this report, indicates healthy progress in the program of eye conservation. The program may not be perfect, but is felt to be workable and sensible.

Saving of Eyes in Industry—A Management Problem*

F. H. Humphreys

MR. HUMPHREYS points out that while the safety department can and should develop the goggles program, only the management can make it effective.

THE methods employed to save eyes in our defense plants are the same as those used in our other plants. They include supplying the type of eye protection needed, trying to convince the employees of the importance of using the equipment provided, and enforcing the goggle rule. The emphasis is placed on the latter.

For years American Car and Foundry plants tried to get men to wear safety goggles to protect their eyes. At first only men engaged in occupations such as grinding, chipping, rivet cutting, etc., where extreme hazards existed, were urged to wear them. No one except a few safety men thought it necessary to protect their eyes, and few men wore goggles, even when doing hazardous work, unless the safety man happened to be around; consequently, in those days eye injuries were frequent and compensation costs high. In an attempt to reduce the accidents and costs, the company adopted a rule requiring workmen to wear goggles when doing hazardous work. Fourteen hazardous occupations were listed. There was some reduction in the eye injuries, but the rule proved difficult to enforce because most men, regardless of their occupation, felt they were exempt from the provisions of the rule.

Foremen often thought the rule did not apply to them even though they might have been directing very dangerous work, and accidents to eyes continued. It was not until steps were taken to

* Presented at the Twelfth Annual Safety Convention of the Greater New York Safety Council, April 23, 1941.

require all employees to wear safety goggles that any plant showed real progress in eliminating eye injuries.

Today such a rule is enforced in all American Car and Foundry plants and it applies to all employees except office employees while in the office. This rule was adopted several years ago after our experience proved it to be both necessary and practical. It had the approval of and was put into effect by order of the vice-president in charge of operations. Prior to the general application of an all-inclusive rule regarding eye protection, any individual plant was permitted to develop and apply its own all-inclusive rule and some of them did. The degree of enforcement of the rule varied in the different plants, depending largely upon the local management's attitude toward the goggle program and the effectiveness of the safety department's educational program.

The company furnishes equipment for the protection of eyes, except prescription safety goggles for new employees, who are charged the actual cost. Prescription lenses are replaced at the company's expense and all prescription lens goggles remain the property of the employees.

Our experience has shown that having a rule and furnishing the equipment are not enough to eliminate eye injuries. Protective equipment must be worn at all times when men are exposed to eye hazards—this means whenever an employee is at work, for eye hazards exist practically every place in our plants.

Many employees in so-called "non-hazardous" occupations do not like to wear goggles because they feel they are not taking any risk without them, but the number of broken lenses in goggles worn on just this type of work has proved to us the wisdom of goggles on every employee.

A painter who had been warned several times about violating the plant goggle rule was called into the office and told that he would lose his job if he was guilty of another violation. While returning to his work he passed between two buildings where he thought there was no eye hazard; his goggle lens was hit and broken when a hot rivet—missed by the pick-up boy inside one of the buildings—flew through a broken window pane. From that moment on this man was one of the most enthusiastic rooters for safety goggles I have ever known.

I could tell you of many other times when men—timekeepers, foremen, upholsterers, etc.—in non-hazardous occupations have saved their eyes with goggles.

Before the establishment of our comprehensive rule, one of the local managers, who had a reputation for watching costs closely, was reluctant to adopt a rule which required every employee to wear goggles, because he felt the expenditure for equipping everyone with safety goggles was not necessary. The safety department had been trying for some time to convince this manager that it was good business to furnish goggles to each employee, but before converting him, an employee at this plant lost his eye. The manager agreed that goggles would have prevented this injury and, after it was pointed out to him that the compensation cost involved in this one accident just about equaled the cost of supplying everyone in this plant with proper goggles, he immediately initiated an all-inclusive goggle program which has been very successful. This manager has since sent us several photographs of broken lenses which have saved eyes.

I am sorry that we have not kept a record of the number of broken lenses for all plants over a period of years, but I am sure the total would be higher than any of us suspect. As far back as 1930 one plant, which had had a "100 per cent" goggle program for six years, proudly displayed a photograph of forty-one men who had had one or more lenses broken while working, without a serious eye injury. One man, a chipper, had a record of three broken lenses. Three riveters in the gang boasted two broken lenses.

All American Car and Foundry plants operated from May, 1938, to December, 1940—two years and eight months—without the loss of an eye. This record was broken when an employee, who had been left by himself to tear out brick from around a boiler, removed his goggles; some mortar entered his eye and scratched it. Infection developed and caused the loss of sight.

We feel that the prevention of eye injuries through the goggle program has helped to reduce considerably our employer's liability expense, which for the year 1940, for all plants, was less than one dollar per hundred of payroll.

After an active interest in the company's goggle programs for sixteen years, it is my opinion that if you expect men to wear gog-

gles, management must be willing not only to furnish proper eye protection, but also to support the goggle program, for only management can exert the pressure necessary to enforce the goggle rule.

To give you an idea of how one of our defense plants dealt with the problem of protecting eyes, I should like to describe briefly what has been done at the Buffalo, New York, plant.

About one year ago the safety and claims department was informed that the company might be called upon to make artillery shell for one of the foreign governments, as well as for our own government in its defense program. This work, if assigned to the American Car and Foundry Company, was to be done at the Buffalo plant which had been closed ten years. We were instructed that no material was to be purchased nor commitments made until actual orders were received. We were further informed that after the receipt of a contract, preparation of the plant was to begin immediately.

We in the safety department knew that our responsibility required us to establish a safety program the minute the first workman was hired, but we could only prepare by making plans in our minds and on paper.

Manufacturing artillery shell was not entirely new to us, as there were still a number of people with the company who had such experience during the first World War. Among these people was the man who is now the general safety supervisor, who knew the hazards encountered in forging and machining shell. In analyzing the operations required for this work, it was readily seen that the eye hazards would be similar to many that existed in the manufacture of railway cars; therefore the rule which requires all employees (except office employees when in office) to wear goggles or other eye protection was applicable to this new work.

We were very glad that the manager assigned to this plant had for many years been a strong believer in "goggles for all." As soon as the supervisory staff was selected, he called them together and told them that all men employed at Buffalo would be required to wear eye protection at all times while at work and that this rule applied to all supervisors as well as other employees. It was essential that the supervisors and foremen set the example for the men. A few days later the vice-president in charge of operations

called a conference of the entire plant administrative personnel and emphasized what the manager had said about eye protection.

On the morning this plant was opened 250 men were employed. Although no goggles had been purchased in advance, a telephone order to one of the large goggle suppliers at 9 A.M. brought a sufficient number of goggles to equip every one of the 250 men with goggles by 1 P.M. Within a few days the office building was cleaned and general routine began to take shape.

Now prospective employees are told of our 100 per cent goggle rule and only those who agree to abide by the rule are employed. After the new men are hired in the employment office, they are taken to the plant dispensary where they are fitted with spectacle-type goggles by the nurse, who has been trained to make the necessary adjustments. The men are told to return to the dispensary if their goggles are not comfortable, or if their work requires any special type of eye protection. They are also told at this time to report to the dispensary if they receive any injury, no matter how slight.

When the new employees reach their place of work they are again instructed by the foreman that it is a requirement of their employment to wear safety goggles at all times; the dangers of eye hazards of the particular jobs are pointed out to them and if the nature of the work is such that special eye protection is needed, the foremen arrange for the employees to be equipped properly. All foremen are advised by the safety supervisor which type of eye protection should be used on each operation.

No doubt many of you are wondering why nothing has been said about the educational part of our program. All plants except Buffalo preceded the 100 per cent goggle rule with an extensive period of education. At Buffalo there was no time for education before the rule became effective, and to our amazement there has been very little resistance to the wearing of goggles; and there have been very few violations of the rule. This experience at Buffalo gives weight to the statement that enforcement is a part of education.

It would be inaccurate to imply that the men hired at this plant had had no safety education, because many of them worked on W.P.A. and others in C.C.C. camps. It is my impression that the safety education given and the discipline maintained by these or-

ganizations made these men more conscious of the use of protective equipment and consequently our task was much easier.

However, without the full support and co-operation of management the goggle program could not have been effective in such a short time, if at all. The safety department can and should develop the goggle program, but only the management can make it fully effective.

A Digest of Problems of Vision Testing for Screening Purposes—*Continued*

Eleanor W. Mumford, R.N.

The REVIEW continues in this issue the series of digests on problems of vision testing for screening purposes. The material presented by Miss Mumford is not inclusive, but represents a selection reviewed by one of the Society's committees, of which she is a member, which has been studying problems of screening for eye conditions. The selection does not indicate that the committee either accepts or rejects the methods or conclusions of the studies digested, but rather that each study has some bearing upon the consideration of problems of vision testing for screening purposes.

Changes in the Types of Visual Refractive Errors of Children. Antonio Ciocco. *Public Health Reports*, vol. 53, no. 35, Sept. 2, 1938, pp. 1571–1578.

Purpose of Study

To investigate changes in type and degree of refractive errors in school-age children.

Group Studied

1,481 white school children in Washington, D. C. (same group previously studied).*

Tests and Techniques Employed*

Snellen before and after cycloplegic, ophthalmoscopic and retinoscopic examinations.

Methods of Conducting Study

1. Retests after average interval of 2½ years (range, 31 months for 6–7 year olds to 26 months for those of 14 years).

2. Analysis of refractive errors of right eye only.

* See abstract, "Refractive Errors in the Eyes of Children as Determined by Retinoscopic Examination with a Cycloplegic." G. A. Kempf, M.D., S. D. Collins, and B. L. Jarman, M.D. Sight Saving Review, Vol. XI, no. 1, March, 1941, pp. 44–45.

3. Degree of error recorded to nearest ¼ D. required to correct to emmetropia (hyperopia and myopia each include even ¼ D. of error plus or minus).

4. Analysis of changes in type of defects and relation between degree and type of error, visual acuity and age.

FINDINGS

1. Frequency of simple hyperopia reduced almost 20 per cent; of astigmatism (hyperopic and myopic) increased 40 per cent; and of myopia increased 70 per cent.
2. Type of refractive error unchanged in over 75 per cent of the eyes; most frequent changes from simple hyperopia and myopia to astigmatism and from astigmatism to simple refractive errors.
3. Chances of changes in type of refractive error appeared to decrease as children got older.
4. Within the 2½ year interval the incidence of myopia (simple and astigmatic) was highest in children 10–11 at first examination and lowest in those 14 and over. The ages for highest incidence rate of astigmatism (all forms) was 6–7 and 12–13; the lowest incidence of new astigmatism cases was also in those 14 and over.

An Evaluation of Vision-Testing Methods in Schools. Preliminary Report. J. B. Hitz, M.D. *American Journal of Ophthalmology*, vol. 21, no. 9, Sept., 1938, pp. 1024–1027. Reprinted in SIGHT-SAVING REVIEW, vol. IX, no. 1, March, 1939, pp. 47–52.

PURPOSE OF STUDY

To develop a satisfactory screening test for use in schools by comparing results from certain common screening tests and from certain ophthalmic tests.

GROUP STUDIED

32 children, 6 to 14 years of age, referred to ophthalmological department of children's hospital; no obvious cases of ocular disease included.

TESTS AND TECHNIQUES EMPLOYED

1. *Betts' tests*, administered as recommended in Betts' textbook
2. Ophthalmic battery
   a. *Snellen* at 6 meters: "uniform artificial illumination," intensity not measured. Normal 20/30 or better.
   b. *Muscle balance:* Duane screen prism and Maddox rod at 6 meters and 33 cm. Abnormal, esophoria at distance or near, 4 D.; exophoria distance, 4 D.; near, 6 D. Duane and Maddox findings averaged.
   c. *Fusion:* Worth Four Dot at 6 meters and 33 cm.
   d. *Depth perception:* Howard-Dolman at 6 meters; depth perception of 50 mm. or under should equal 100 per cent stereopsis on

Betts and, conversely, 100 per cent on Betts might logically show no depth perception on Howard-Dolman.

e. *Retinoscopy** (Under cycloplegia): limits of normal −0.25 D.,† +1 D. and 0.50 D. astigmatic error.

METHODS OF CONDUCTING STUDY

1. Comparisons made between
   Snellen alone
   Betts' tests (in toto)
   Ophthalmic battery (in toto)
   Component parts of ophthalmic battery and their counterparts in Betts.
2. All tests given twice to 32 children without glasses and with—if any. (48 examinations two eyes, total, 96 tests.)
3. Evaluations for visual acuity based on figures agreeing within 20 per cent (industrial percentage scale of visual loss).‡

FINDINGS (Presented without tables; no detailed analysis of data):

1. Snellen alone indicated defects in 24 or 50 per cent; Betts in 43 or 89 per cent; ophthalmic battery in 33 or 69 per cent.
2. Betts and ophthalmic methods agreed: for visual acuity in 74, for muscle balance in 81, for fusion in 49 of 96 tests; for depth perception in 34 of 47 tests; for sharpness of vision tests§ in 25 of 32 subjects with uncorrected vision and in 9 of 16 with correction.
3. Higher deviations from normal were found by Betts' method than by ophthalmic for all tests except that for muscle balance. For sharpness of vision tests§ Betts showed errors in 7 of 16 "when error was fully corrected to the best of the author's ability."
4. Reasons given for discrepancies: Dot test misses higher astigmatic errors; stereoscope allows suppression; muscle balance standards (both Betts and ophthalmic) arbitrary; stereoscope stimulates convergence which also affected fusion findings as did difference in visual angles; Howard-Dolman apparatus presents approximately natural while stereoscope creates artificial depth perception.

The Betts Visual Sensation and Perception Tests, a Method of Detecting School Children Requiring Ocular Attention. L. Oak, Ph.D., and A. E. Sloane, M.D. *Archives of Ophthalmology*, vol. 22, no. 5, Nov., 1939, pp. 832–843.

* Retinoscopy was made by author within six months prior to the study.

† In the text, this figure appears as "minus 25 D.," which was interpreted as an obvious typographical error.

‡ Berens, Conrad, editor, *The Eye and Its Diseases*, Philadelphia: W. B. Saunders Co., 1936, page 173.

§ Ophthalmic test for this based on retinoscopy (see above under Tests and Techniques).

Purpose of Study

To study the Betts series of stereoscopic tests.*

Group Studied

Two groups of 100 children each.

Group A: From rural and semi-rural schools; ages 9–15 years; 65 boys, 35 girls who were handicapped in reading or suspected of having visual difficulty.

Group B: Fourth grade of a town school and all pupils of two rural schools; ages 6–15 years; 51 boys, 49 girls "selected at random."

Tests and Techniques Employed

1. *Betts DB Series*† given twice.

2. *Ophthalmological examination:* (All techniques are given below exactly as mentioned in the study.) Cycloplegic omitted on the basis of separate investigation. (See 2 below under Methods and 1 under Findings.) Visual acuity each eye separately and two eyes together; interpupillary distance; convergence near point; external examination; ocular motility; pupillary reactions; tension (digitally); ophthalmoscopic; retinoscopic; subjective refraction (Snellen and astigmatic fog test); phoria (distance and near using cover test).

Methods of Conducting Study

1. Betts' series given twice and scored first according to the manual of instruction and second according to a "system" developed by a representative of the manufacturer (who did this scoring himself).

   Group A: two series given by research assistant about a year apart.

   Group B: two series given by nurses about a month apart (40 children rechecked by member of research staff because of "errors or omissions in recording").

2. To determine the relative importance of cycloplegic, another group of 25 children examined with and without cycloplegic using the same ophthalmological procedures and criteria as in the study (see 1 below under Findings).

3. To verify consistency of ophthalmological findings, 25 children of Groups A and B were re-examined without reference to previous findings (see 2 below under Findings).

4. Ophthalmological examination was given to all children in both groups who were classified according to the following criteria:

   a. No recommendations: hyperopia up to +1 D.; hyperopic astigmatism up to +0.75 D.; compound hyperopic astigmatism up to +1 D. sph. with up to +0.75 D. cyl.

* This study is a part of the Research Learning Project sponsored by the Division of Child Hygiene, Massachusetts State Department of Public Health.

† Betts' Visual Sensation and Perception Tests, DB Series, Keystone View Company, Meadville, Pennsylvania.

b. Refer if school work warrants*: hyperopia +1 D. to +2 D.; hyperopic astigmatism +0.75 D. to +1.25 D.; compound hyperopic astigmatism +1 D. to +1.50 D. sph. with up to +0.75 D. cyl. or up to +1 D. with +0.75 to +1.25 D. cyl.

c. Examination indicated:
If uncorrected vision with simple myopia is less than 20/30 in each eye; with simple or compound myopic or mixed astigmatism is 20/30 or less.
If amblyopia is not improved to at least 20/30.
If exophoria for near or esophoria for distance exceeds 10 prism D. or if hyperphoria for distance exceeds 0.5 prism D.
If pathologic involvements are present.
If history of diplopia is given.

d. Yearly check-up: those wearing glasses.

FINDINGS (Presented in tables and text without detailed analysis of either Betts or ophthalmological data; no effort made to compare telebinocular tests with their supposed ophthalmological counterparts):

1. Examination of 25 children of another group with and without cycloplegic resulted in a changed classification of only one child from "refer if school work warrants" to "examination indicated."
2. Re-examination of 25 children within a month revealed no changes in classification.
3. First and second telebinocular tests agreed in 81 per cent of the cases.
4. Whether scored by manual or "expert's" system, Betts tests failed many whom ophthalmologist passed.
   Group A failures: manual score, 97; passed by ophthalmologist, 52; "experts'" score, 81; passed by ophthalmologist, 29
   Group B failures: manual score, 89; passed by ophthalmologist, 73; "experts'" score, 55; passed by ophthalmologist, 42
5. Whether scored by manual or "expert's" system, Betts' tests passed some ophthalmologists classed "examination indicated." The figures for this were:
   Group A: manual score, 3 (100 per cent of those classed as passing), "expert's" score, 5 (out of 19 classed as passing)
   Group B: manual score, 1 (out of 11 classed as passing), "expert's" score, 4 (out of 45 classed as passing)

Visual-Acuity Tests.† S. S. Blankstein, M.D., and M. J. Fowler, M.D. *American Journal of Ophthalmology*, vol. 22, no. 12, Dec., 1939, pp. 1377–1382.

* In addition to referral if school work warrants, provision is made for referral of "borderline errors" if general health appearance indicates they may not be adequately compensated.

† Research under direction of Dr. E. V. L. Brown on grant from Keystone Company.

Purpose of Study

To compare individual components of the Betts tests with comparable standard ophthalmic tests. This study reports on efforts to evaluate visual acuity portion of Betts tests as compared with standard Snellen test.

Group Studied

Clinic group of adults. 16–60 years of age	466 visual acuity recordings 310 of individual eyes 156 of both eyes together
School children...... 7–12 years of age	920 visual acuity recordings 614 of individual eyes 306 of both eyes together

Tests and Techniques Employed

1. *Snellen:* 20 feet; uniform illumination, intensity not specified; sufficient time was allowed to read individual letters "pointed out to them."

2. *Betts cards DB1, 2, 3:* stereoscopic apparatus; illumination as provided by manufacturer. When the vision in an individual eye was lower when the dots were presented to only one eye (both eyes open), then the binocular vision occlusion was used.

Method of Conducting Study

1. A table from the Keystone View Company publications is used showing the following ratios between Snellen values and Betts dot-arrangement values:

Betts	Snellen	Decimal*	A.M.A.† percentage efficiency
1	20/200	0.1	20%
2	20/150	0.13	30%
3	20/122	0.16	40%
4	20/100	0.2	50%
5	20/75	0.27	60%
6	20/60	0.33	70%
7	20/45	0.44	80%
8	20/33	0.6	90%
9	20/30	1.0	100%
10	20/15	1.3	105%
11	20/10	2.0	110%

* The decimal system is achieved by reducing the Snellen fraction and should not be interpreted as representing the degree of vision. As will be seen from the A.M.A. percentage rating of visual efficiency, 20/200 = 20 per cent vision, not 0.1 or 1/10 vision.

† A.M.A. Percentage Rating of Visual Efficiency: Report of Commttee on Compensation for Eye Injuries: Appraisal of Loss of Visual Efficiency—Standard Method Approved by the House of Delegates of the A.M.A., May 26, 1925. *Transactions* of the Section on Ophthalmology, 1925, page 370. (While the article appears to attribute the entire table to the Keystone View publications, a separate reference is made to this source as the authority for the A.M.A. rating values. However, comparison of the rating values given in this reference with those quoted in the table above shows that in not all instances are the distance intervals identical and that the A.M.A. gives no percentage rating for 20/15 and 20/10. Reference to Betts "The Prevention and Correction of Read-

2. Accurate comparison between results of Snellen and Betts tests were difficult because of unequal spacing of steps. The decimal system† was therefore used in study to facilitate comparisons.
3. Results of comparison between Betts and Snellen tests are affected by the interpretation of what constitutes similar readings on each test. The figures were therefore interpreted and tabulated on two bases:
   a. A difference in the two readings of less than 0.1†* was accepted as equal results for visual acuities of 20/33 or less and for better than 20/33 a difference of less than 0.2 was acceptable.
   b. A difference in the two readings of 0.1†* was accepted as equal results with visual acuity of 20/33 or less and with better than 20/33 a difference of 0.2 was acceptable. The latter represented a more liberal allowance since one whole Snellen line of difference was considered necessary for a disagreement between the tests whereas in the former less than a line was used.
4. In using Betts test occlusion was practiced to obtain best results where indicated (see Techniques).

Findings

1. The two bases of comparison used give marked differences in results.
   a. Analysis of results was made on basis of percentage agreement, percentage higher visual acuity with Snellen and lower visual acuity with Snellen. With the more liberal allowance (see above Methods 3b) the greatest agreement of individual eye tests was 67 per cent in adult group and 75 per cent in child group; of binocular tests 78 per cent in adults and 69 per cent in children.
2. Betts charts are not an accurate measurement of visual acuity compared with Snellen charts and especially in measuring subnormal acuity.
3. In determining the presence of normal vision, the two tests were in close agreement in single-eye tests.
4. Suppression is a frequent factor in Betts tests and a small factor in Snellen tests.
5. Age is not a contributing factor in the difference between Betts and Snellen findings.
6. Both methods take about the same length of time.

---

ing Difficulties" Row Peterson and Company, Evanston, Illinois, shows that he frequently compares the Betts distance values with A.M.A. percentages, and in a publication of the Keystone View Company entitled "Data on Visual Sensation and Perception Tests Part II" by Betts, he gives the Snellen fraction ratio to percentage of visual efficiency as quoted above.)

* See table under Method, 1, p. 141.

† See first footnote, p. 141.

Evaluation of Three Methods Commonly Used in Examination of Eyes of School Children. B. C. English, B. C. Shmukler, M.D., and A. Cowan, M.D. *Archives of Ophthalmology*, vol. 22, no. 6, Dec., 1939, pp. 1068–1073.

PURPOSE OF STUDY

To evaluate three common methods of screening for visual defects of school children.

GROUP STUDIED

485 school children, 8–10 years of age, third grade.

TESTS AND TECHNIQUES EMPLOYED (A child considered failing unless he "reacted normally" to all of the tests by any one of the three methods of testing):

1. *Betts' tests.**

2. *"N.E.A.M.A." method.*† (Very specific directions for technique; no definite statement of limits of normal for visual acuity.) Snellen at 20 feet; not less than 10 foot-candles of illumination evenly distributed over chart; no glare within child's field of vision, chart at eye level. Symptoms (a specific list including observations of reactions to test, appearance of eyes and lids and history of difficulty with vision or reading).

3. *School medical inspection.* Snellen at 20 feet; chart hung on wall against dark background at eye level (illumination not specified). Symptoms (inspection of lids, conjunctiva, cornea, and eyeball).

4. *Ophthalmological examination* (criteria for normal not stated). Pre-cycloplegic, cycloplegic, and post-cycloplegic tests: visual acuity, inspection of external appearance, ophthalmoscopic, muscle balance (distance and near), duction, accommodation, stereopsis.

METHODS OF CONDUCTING STUDY

1. Entire group given all three of the tests listed above; 111 given ophthalmological examination:
   a. 91 who had failed one or more of the preliminary tests.
   b. 20 who passed all preliminary tests.
   (Method of selection of these two groups not indicated.)
2. Betts' and N.E.A.M.A. tests given by same school nurses.
3. Ophthalmological examination given without access to data from preliminary tests.

* Betts' Visual Sensation and Perception Tests, Keystone View Company, Meadville, Pennsylvania.

† Conserving the Sight of School Children: Report of the Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association with the co-operation of the National Society for the Prevention of Blindness. Publication 6, National Society for the Prevention of Blindness, 1790 Broadway, New York City. (Directions for this test are distributed by the National Society for the Prevention of Blindness under the title of "Eye Inspection and Vision Testing"; available on request.)

4. Betts series and findings from ophthalmological examination presented in summary form. (Data presented do not permit comparison of findings regarding various aspects of visual functioning.)

Findings

1. Of 485 children tested:
   a. 184 passed all three tests.
   b. 40 failed all three.
   c. 301 failed one or more.
   d. 77 failed school medical inspection.
   e. 124 failed N.E.A.M.A.
   f. 260 failed Betts.
2. Ophthalmological examination confirmed the absence of ocular defects in 20 children who had passed all three of the preliminary tests.
3. Ophthalmological examination of the 91:
   a. Confirmed the presence of ocular defects in
      (1) 35 of 79 children who failed Betts tests.
      (2) 35 of 43 who failed N.E.A.M.A.
      (3) 25 of 38 who failed school medical.
   b. Detected ocular defects in
      (1) 7 of 12 who passed Betts.
      (2) 7 of 48 who passed N.E.A.M.A.
      (3) 17 of 53 who passed school medical.
4. N.E.A.M.A. method most dependable of the three; of the 7 children missed by Betts, 4 were picked up by N.E.A.M.A. because of symptoms (these all had correctible amounts of hypermetropia) and 2 because of failure on Snellen (these and one other missed by both N.E.A.M.A. and Betts had "correctible amounts of myopia").
5. School medical inspection as routinely practiced "unreliable."

Case-Finding Procedures Developed by the Astoria School Health Study. George M. Wheatley, M.D. *The Child*, vol. 4, nos. 11 and 12, May–June, 1940, pp. 283–291.

Purpose of Study

The major purpose was to adapt school health service to changing medical and educational concepts. One section aims:

a. To allocate responsibility for selection and follow-up of pupils with visual defects.
b. To determine reliability of teacher selections.
c. To institute follow-up procedures.

(Only this section included in abstract).

Group Studied (In vision screening program):

School children in Astoria (New York City) public schools. (No further description of group except that they apparently were second grade

or above and that figures are analyzed for "results of vision tests of 6,889 children.")

TESTS AND TECHNIQUES EMPLOYED

Snellen (no techniques given). Basis of referral 20/40 or less.

METHODS OF CONDUCTING STUDY

1. Teachers gave vision tests in their classrooms; referred to nurse those with 20/40 or less vision.*
2. In first part of study nurse "rechecked under standard conditions" all those referred; later nurse rechecked only those with 20/40.
3. Those with 20/40 or less and "the best possible correction" advised to return to person who prescribed glasses for periodic re-examination. (No indication as to how it is determined that present glasses represent "best possible correction.")
4. Evaluation of reliability of case selection on the basis of
   a. Comparison of teacher's findings (classroom conditions) with nurse's findings ("standard conditions").
   b. Substantiation† of referrals by teacher and/or nurse by oculists or optometrists.

FINDINGS

1. On the basis of nurse's recheck of referred cases: teachers' selections of those with visual acuity of 20/50 or less found reliable while selection of those with 20/40 was reliable in only 40 per cent of the cases.
2. On the basis of return reports from examiners ("optometrists, oculists and so forth"): nurses' referrals of teacher-selected cases of 20/50 or less and her own rechecks of 20/40 or less "substantiated"† in 95 per cent of cases; 100 in first class number, not stated for second.

As a result of the study, procedures were revised as follows:

1. Teachers test all children (apparently "from second grade on") and refer to nurse those who have visual acuity of 20/40 or less in either eye.

2. Nurse rechecks only those with 20/40.

3. Nurse follows up for correction those with 20/50 and those for whom her recheck confirms 20/40.

(Figures are presented for four half-years to show diminishing percentage with 20/40 or less, diminishing case load for follow-up by nurse, and increasing percentage with 20/40 or better with or without glasses).

Methods for Visual Testing in Schools. J. B. Hitz, M.D. *Archives of Ophthalmology*, vol. 24, no. 2, Aug., 1940, pp. 221–224.

* In a personal interview, Dr. Wheatley told me that approximately 1,000 children were given a Snellen test in classrooms under conditions identical with those used by teacher and agreement of findings was very high. This is not mentioned in report.

† The method of substantiation by examiner is not explained; may mean reports received corroborating findings or that glasses were found necessary for these children.

Purpose of Study

To evaluate some of the present methods of screening for visual defects used in schools.

Group Studied

745 school children, 8–16 years of age.

Tests and Techniques Employed

1. *Snellen:* at 20 feet; illumination 20 foot-candles; limits of normal 20/30 or better.
2. *Betts tests:**
   Limits of normal:
   a. Scored on basis of Betts' text.
   b. Scored on percentage basis† (5–10 per cent reduction for each failure, 75 per cent for all tests passing).
3. "*Hitz ophthalmic group*"
   Snellen: standards as above.
   Worth Four-Dot at 6 meters and at 33 cm. (Each dot subtends 13.3 minute visual angle; distance between dots 40 minute angle.)
   Standards for normal—fusion at distance and near.
   Duane Screen at 6 meters and at 33 cm. (sometimes called alternate cover test for muscle balance).‡
   Standards for normal—At 6 meters, no consistent in or out movement; at 33 cm. no outward movement, inward movement neutralized by 5 D. prism base in.

Methods of Conducting Study

1. All tests given to all children by three lay testers (3 hours' individual instruction).

2. Comparisons made between Betts tests (scored according to Betts standards and according to percentage scale outlined above) and the Snellen alone and also between the Betts tests of each function with its counterpart in the "Hitz ophthalmic group."

3. Order of tests alternated to exclude fatigue factor.

Findings

1. Comparison of Betts' test with Snellen alone and with "Hitz ophthalmic group":

Test	*Passed*	*Failed*
Snellen	89.7%	10.3%
Betts (scored on Betts standard)	17.4%	82.6%
Betts (scored on percentage scale)	58.4%	41.6%
"Hitz group"	55.4%	44.6%

* Betts' Visual Sensation and Perception Tests, DB Series, Keystone View Company, Meadville, Pa.

† "Davenport Iowa Method."

‡ See digest of "The Vision of Pre-School Children—An Analytical Study of 982 Children," Sight-Saving Review, Vol. XI, no. 1, March, 1941, p. 47.

2. Degree of agreement between Betts tests of each visual function and its counterpart in the "Hitz ophthalmic group":

	Snellen	*Worth*	*Duane*
Results with Betts tests agreed with	90.5%	53.5%	68.9%
Failed Betts—passed other	8.0%	35.3%	26.4%
Passed Betts—failed other	1.5%	11.1%	4.5%

3. Time: Betts' tests took almost twice as long to give as "Hitz ophthalmic group."
4. Snellen alone misses many cases—fusion and muscle difficulties.
5. Betts tests "too discriminating" and do not correlate with accepted and comparable ophthalmic tests.
6. Use of stereoscope introduces psychic factors which inhibit normal binocular vision.

Massachusetts Vision Test. An Improved Method of Testing Eyes of School Children. A. E. Sloane, M.D. *Archives of Ophthalmology*, vol. 24, no. 5, Nov., 1940, pp. 924–939.

PURPOSE

To develop a screening procedure for use in schools.

GROUP STUDIED

1. Introductory tests: Groups varied in size, description omitted.*
2. "Massachusetts Vision Test":
   a. 313 school children, 7 to 15 years of age (1938–39).
   b. 3,430 school children (age not specified) (1939–40).
   c. 278 school children—Weston.
3. For "out-of-state" tests: 90 school children.

TESTS AND TECHNIQUES EMPLOYED

1. Introductory tests:
   a. Positive relative accommodation: a pair of spectacles with −3 D. sphere to read 20/20.
   b. Prism convergence: a pair of spectacles with 6 prisms; the 20/200 letter fixed; if seen singly, the influence of prisms was successfully overcome.
   c. Stereoscope for single binocular vision and phorias.
      (1) Split E card for single binocular vision.
      (2) Horizontal phoria evaluated by using a card with calibrated rectangular enclosure for right eye and small ball for left.
      (3) Vertical phoria same with smaller ball test for displacement above or below line tested at near and distance.

* Emphasis in study is on procedures of "Massachusetts Vision Test"; contributory data not fully presented.

2. "Massachusetts Vision Test":
   a. Snellen at 20 feet, using 3 special charts with the 20/20 and 20/30 lines, 8 symbols per line and one line of 4 symbols ranging from 20/100 to 20/40. Artificial illumination, two 25-watt bulbs. (Methods of placing and shielding bulbs not indicated.) Chart illumination: 16 foot-candles. Limits for passing: 20/20−2. Retested all who failed, preferably by another person. One child in room at a time. Each eye tested separately and both together.
   b. Snellen charts as above with +1.50 D. sphere in spectacle frames. Child closes eyes, then opens to read 20/30 line. If 20/30 read successfully, tries 20/20 which, if read, indicates failure.
   c. Maddox rod. Two pairs of spectacles, each containing a red Maddox rod for right eye—vertical and horizontal.
      (1) Heterophoria for distance at 20 feet. Fixation object a 5-watt nonfrosted bulb projecting through window of pictured house, calibrated to equal 6 prisms of esophoria, 4 prisms of exophoria, 1.25 prisms of hyperphoria.
      (2) Heterophoria for near. Block attached to a 16-inch cord with pencil flashlight seen through pinhole aperture calibrated to 6 prisms of esophoria, 8 prisms of exophoria. Block is kept at 16-inch distance by placing one end of the cord at the eye and holding the block directly in front and the length of the cord from the eye.

      (Techniques for administration are outlined in detail, even as to phrasing of key questions.)
   d. Ophthalmological examination with and without cycloplegic (group 2-a only). (Ophthalmological tests and techniques not indicated.)

METHODS OF CONDUCTING STUDY

1. Introductory tests tried out and eliminated. Test No. 3 (stereoscopic) was tested against (a) "routine phoria test by staff ophthalmologist" and (b) Maddox rod by technician.
2. "Massachusetts Vision Test"
   a. Failure to pass any test indication for omitting remainder.
   b. Test given to groups 2-a and 3 by ophthalmologist and technician, groups 2-b and 2-c by teachers and nurses only.
   c. Comparative data for group 2-a are limited to analysis of percentage passing or failing "Massachusetts Vision Test" in relation to percentage failing ophthalmological examination. Figures are given showing those passed by ophthalmologist and failed by the component parts of "Massachusetts Vision Test."* For group 3, a limited comparison is made between the comparative ophthalmological examination and "Massachusetts Vision Test." Group 2-b analyzed on basis of percentage failing each component test of the "Massachusetts Vision Test." Group 2-c specially scored and analyzed on same basis as for group 2-b.

* Because of elimination practice stated above (see Method 2-a), these figures cannot be interpreted since the numbers originally taking or failing component tests are not stated and must in some cases be extremely small.

FINDINGS

1. Introductory tests all eliminated; 1-a eliminated as giving unsatisfactory results on first trial; 1-b because it screened out only one of 350; 1-c as misleading to lay people, presenting psychological sense of nearness and because a poor stereoscope introduces errors and a good one is expensive.
   When compared with ophthalmological findings for Snellen test, teachers showed disagreement in 3 times as many cases as trained technicians.
   When properly administered, "Snellen is the single most effective procedure for detecting children who require attention of ophthalmologists."

2. "Massachusetts Vision Test"—In group 2-a, 9 per cent of those passed by ophthalmologist (161) were failed by the "Massachusetts Vision Test"; 2 per cent of those failed by ophthalmologist (87) passed "Massachusetts Vision Test"; in group 2-b (3,430), 43 per cent failed "Massachusetts Vision Test," 32 per cent Snellen, 7 per cent sphere, 4 per cent Maddox; in group 2-c (see Method 2-c for scoring), of 278, 28 per cent failed, 21 per cent Snellen, 5 per cent sphere, and 2 per cent Maddox; in group 3, of 90, 19 failed by ophthalmologist because of refractive errors, of whom 15 also failed "Massachusetts Vision Test"; 2 failed by ophthalmologist because of heterophoria, one of whom also failed "Massachusetts Vision Test."

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request.

Headaches Due to Eyes*

A headache that is not present in the morning but comes on gradually during the day and is worse by evening is usually an eyestrain headache. If additional information is elicited that the headache occurs after prolonged use of the eyes, such as reading or going to shows, it is pretty definitely so. Unfortunately all eye headaches are not so typical. Headaches due to eyestrain and eye disease constitute a large majority of all headaches. The percentage figures vary a great deal among different authors. It is placed at anywhere from 25 to 85 per cent.

The fact that a person has 20/20 vision in each eye does not mean necessarily that he may not have eyestrain. Small errors of astigmatism often cause headache and eyestrain, while a person may have more than a diopter of astigmatism and merely get glasses because of poor vision and not because of headaches. The fact that a person wears glasses does not exclude this as a possible cause of headache, or the fact he has had a recent change of glasses does not always exclude it as a cause.

People under forty-five who are not myopic should have an examination under a cycloplegic, provided the tension is normal and the fundus is examined first. Of those who are myopic, the refraction will be more satisfactory if done twice, once with cycloplegic and once without.

A person having hyperopia, who does not have relief of the headache immediately or within a few days after obtaining glasses, should not be too critical and condemn the glasses or the doctor, as it takes several weeks in some instances to

*Extracted, with permission, from an article entitled, "Headaches," appearing in the November, 1940, issue of *Northwest Medicine.*

produce relaxation of ciliary spasm and fatigue.

Muscle errors also cause considerable headache. No refraction is complete that does not measure these factors. The vertical phorias are more inclined to give rise to headaches than other types, even when the error is not great. Exophoria is more inclined to give rise to headache than esophoria in my experience, because of the additional load on convergence for near work. Convergence excess when mixed with astigmatic errors, as it usually is, does produce headache.

Ciliary weakness or fatigue can be measured by the accommodation tests. It is relieved by correct wearing of proper glasses but is often found to be aggravated by very many conditions elsewhere in the body, such as the toxins from bad teeth or tonsils, thyroid disturbances, blood dyscrasias, and many others.

Ciliary spasm is created by trying to accommodate too much. It is usually found in the farsighted person and is also relieved by correct glasses.

A different size image in one eye as compared to the other creates confusion of the images in the brain. The complex attempt to produce adjustment creates headaches of variable intensity.

Glaucoma is one of the less common causes of headaches because incidence of the disease is not so great in proportion to the number of headaches. It is one of the leading causes of blindness and may be easily overlooked in the incipient stage, as there is no redness of the eyes and the cupping of the discs has not yet occurred. In glaucoma, the headache is dull or intense and is as often in the back of the neck or occiput or in the temples as it is in the eyes and forehead.

Disease of the retina, choroid and media are free of headaches. Disease of the lids and lacrimal apparatus do not give rise to headaches. It is quite commonly stated that myopia does not produce headache. In my experience there is considerable error in this, and, since becoming interested in the subject of headaches, I have paid particular attention to this and note that myopic patients often are relieved by correct glasses. It may be that, in an effort to get better vision, they compress the eyeball with the lids and set up a headache of neuromuscular fatigue.

—Edwin D. Warren, M.D.
Tacoma, Washington

Parents—Look to the Eyes

The home and the parents in that home are the most important elements in maintaining efficient eyesight because they have the opportunity of observing their children at all times of the day and year. Early in the morning, do they come to breakfast clear eyed and rested, or are Mary's eyelids red and puffy?

And later at night, does John rub his eyes and wiggle his book around to get the right light on his work? Parents are in the key position to watch for changes. They also set the stage by providing the physical setting, chairs, lights, sleeping quarters, and diet—all important elements in keeping the eyes functioning at their maximum capacity and with the greatest ease and comfort. The parents' attitudes on doctors, on care of eyes, affect the eyes of their children vitally. In other words they are all important in maintaining the efficient eyesight which they and their children need for living.

The day of the naked bulb hanging by a cord from the center of a room is gone. Today the modern home is well equipped with windows, light fixtures, and light sockets in the correct places. All we have to do is use them effectively. To do this a few simple rules are necessary, most of which are generally already known: suit the amount of light to the job to be done and the condition of the eyes; dark furniture, drapes, and walls cut down the light; light colors reflect light.

Daylight is diffused light, and it is well to try to approximate this with artificial lighting. Fifteen foot-candles of light have been found to be most comfortable with which to read. This can be discovered by using the light meter—found in homes of camera lovers. A 100-watt bulb is generally best for reading. Light should be free from glare, harsh contrasts, and shadows. Mirrors, pictures, and shiny furniture often create a glare. Light should come over the left shoulder for right-handed persons and over the right shoulder for the left-handed person, and its source should be above the level of the eyes. (The indirect lamps sold today, labeled I. E. S.—Illuminating Engineering Society—are properly designed for good illumination.) Reading materials are best on dull paper, black print, wide margins, even print—especially mimeographed material.

Furniture in the home should be movable. That means that if light isn't right for John to study by, he should be permitted to move his desk or lamp around so that it is right. No one should stare directly into a light or a window.

Good lighting cuts down accidents in the home, particularly on cellar steps, laundry, kitchen, and bathroom. Generally speaking, then, uniform light spread over the whole ceiling, with light on book or work, sufficient for comfort and safety, is the best type of lighting.

Efficient lighting is important because the act of seeing is just like taking a picture with a camera. In taking a picture the light is reflected from the object, goes through the shutter, is deflected by the lens on to the plate or film, setting up a chemical reaction. In seeing, the light reflected from the object goes

through the pupil, is deflected by the lens on to the retina or optic nerve, setting up a chemical reaction. In taking a picture, if the focus is inaccurate, a blurred picture results. This is what happens in the case of the nearsighted or astigmatic eye or cross-eyed persons—the point of focus is inaccurate. In the nearsighted it is in front of the lens, in the farsighted, behind, and the astigmatic rays are irregular. If the light is not adequate, dull pictures result; if spotty, a streaked picture results, but if bright and well focused, a sharp picture with clear outlines will be seen.

If two cameras are placed a few inches apart, an overlapping picture will result. That is exactly what eyes do. It is this overlapping in the center which gives the sense of depth or distance.

The cross-eyed person or person who uses one eye does not have this appreciation of depth. That is true particularly of the child who has never used more than one eye. The use of one eye limits the field of vision. This is one of the reasons for early correction of cross-eyes. The one-eyed driver has his range of vision reduced by about 40°—compensated for by turning his head.

The perfect eye is able to take from 12 to 14 pictures and send these pictures to the brain every second. This speed of seeing is reduced by half when only one eye is used.

Another thing which reduces speed of seeing is lack of visual purple, which is the chemical released in the retina by light. Science is not quite certain of all the steps in this chemical action, but it has been proved that certain vitamins seem to affect the efficiency of this procedure—Vitamins A and G particularly. Vitamin G is found in yeast and yeast products, milk, eggs, and leafy vegetables. Vitamin A is found in butter, cream, cod and halibut liver oil, beef fat and nut oils; meats, such as kidney, heart, glands, brain and sweetbreads; fish, especially salmon, and fish roes; milk—whole raw, sweet condensed—and whole milk cheeses; eggs and fresh vegetables, particularly the carrot and sweet potato—fresh and raw—cabbage, spinach, lettuce and bananas. We all have heard of carotene; it comes from the lowly carrot and is essential for visual acuity.

Dr. Parran, Surgeon General of the United States Public Health Service, recently told of an experience he had in Denmark directly after the World War. He visited a home with 600 blind children. On inquiring into the cause of blindness, he was told that these children had been fed on milk, egg, and butter substitutes during the war, and Denmark had literally sold the sight of her children. These were, of course, extreme cases of avitaminosis. The earlier evidences are watery eyes, red lids, blurred vision

and night blindness. Vitamin G deficiency causes loss of eyelashes, conjunctivitis, and a pasty condition of eyelids in animals. Today bananas have been added to diet of infants and old people, and in the latter case Vitamin G is believed to decrease cataract. Nutrition is very important in the young child and pregnant mother, and to eye health all through life.

The normal eye in infancy is far-sighted; in youth through 40–45, the eye adjusts readily to near or far work; after that it becomes presbyopic—that is, the lens thickens slightly and the muscles adjust less readily. Any deviation from these norms is cause for examination.

Indications of eyestrain are headaches, light sensitiveness, watery eyes, sties, itchy lids, irritability. Scowling at the page when reading or writing and the blurring of the page are typical signs that something is wrong.

The cause may be focal infection, sinus, infected tonsils, or general run-down condition. The thing to do, of course, is find the cause. For general checkup see the family physician, who will refer you to the proper specialist for an eye examination. If funds are low or budget won't permit, the eye, ear, nose and throat hospitals are excellent. They give good care at a minimum cost.

If glasses are prescribed, be sure your child wears them. If they are for reading only, don't allow them to be used at the movies. And be sure they are clean and sitting correctly on his nose, not tipped forward or to one side. The parent has a task in making his child use glasses, especially at first. Help him—don't make fun of him, don't nag him, but see that they are placed where he will see and use them.

Sun glasses, by the way, should be used as little as possible. Hats protect the eyes and also the head and back of the neck, which is important in extreme heat and sun. The fad of sun glasses has been overdone. Use them only on beach, water or in snow. Supersensitiveness to light is a symptom—needs treatment, not sun glasses.

The job of getting the myopic child away from books often stumps many parents. These children generally love to read and start early because they do it more easily than anything else. They need social activities in which they can participate with others. The wise parents plan these activities. Not the movies, but such things as hikes, picnics, family parties, dances, lectures, Sunday school activities, and clubs, such as the Boy Scouts, provide outlets. If he is interested in sports and must wear his glasses when playing, get him an eye guard. And coming back to the movies—be sure they are clear movies. Old films often shimmer and are light streaked. This applies to home-shown, school films and commercial ones as well.

In conclusion, early discovery and treatment are important in cases of eye defects and eyestrain. Good light should be judged by the ease and comfort with which you can do a specific job. It should be general, indirect, and come from above the eye level. Remember the left-handed child—light should come over his right shoulder. Intensity of 15 foot-candles is found to be the most comfortable. Vitamins G and A, rest, and relaxation, all are important in maintaining good eye health. The best is not too good for the eyes—have them examined periodically.

Again I say, good vision is a valuable possession—essential for safety, success and happiness in the world today. Help your family keep it!

—Alma Ebeling
Washington, D. C.

News of State Activities

> THIS Section is devoted to the reporting of sight conservation activities carried on by official and voluntary agencies throughout the country. It presents information supplied by these groups, and serves as a medium for exchange of experiences. Only brief and timely items can be used, because of the limitations of space.

Colorado

"During April and May of 1941, 555 children of school and preschool age were given diagnostic examinations by ophthalmologists in sight conservation clinics, sponsored by the Division of Maternal and Child Health of the Colorado Division of Public Health in co-operation with the Colorado Ophthalmological Society and certain local county organizations. The clinics served five counties and included eleven clinic days. The ages of the children examined ranged from one to twenty-two years of age with a median age of twelve years, six months.

"According to the plan, preliminary screening was done by the local public health nurses and school teachers. Any child with visual acuity of 20/30 or less, or any child having subjective symptoms such as excessive lacrimation, blurring, secretion, unusual posture, et cetera, was considered eligible for the diagnostic examination. Refraction appointments were arranged on the basis of medical and financial need.

"Out of the total number of children examined, refractions were recommended for 441. Two hundred twenty-three children were refracted. Of this number, 173 had glasses prescribed; lenses were not prescribed for 41, post cycloplegia examinations were recommended for six and the present lenses of 13 children were considered satisfactory. The procuring of glasses for the medically indigent usually presents quite a problem. However, through the active participation of the local welfare departments, service clubs, such as the Elks and Lions, the American Legion Auxiliary, and private welfare groups, every child was fitted with the prescribed correction. Follow-up services will be given by the local public health nurses and welfare workers with the medical social consultant of

the Division of Maternal and Child Health giving consultation and direct service where the needs indicate."

—Division of Maternal and Child Health, Colorado Division of Public Health, Denver, Colorado

District of Columbia

"With the end of the school year the District of Columbia Society for the Prevention of Blindness brings to a close its fourth vision testing program.

"Volunteers trained under the direction of the Society carry on this commendable work and cannot be praised too highly for their faithful and indefatigable efforts.

"Preschool children in the Child Hygiene Centers of the Health Department were given 697 vision tests. Sixty-nine youngsters were referred for eye examinations as having vision less than 20/30.

"In the parochial schools, 4,463 pupils received vision tests and 845 of them were found to have vision less than 20/30.

"It is interesting that the percentages for these recent totals repeat those of former years, namely, among school children nearly 20 per cent have subnormal vision in contrast to 10 per cent for preschool children."

—District of Columbia Society for the Prevention of Blindness, Washington, D. C.

Illinois

"The Illinois Society for the Prevention of Blindness has been working all winter on the enactment of an improved Fireworks Bill for the State of Illinois.

"House Bill 70 was introduced at the Illinois Legislature on January 20. The Bill remained in Committee until the 25th of March. Committee amendments which allowed the retail sale of sparklers and flower-pots were added to the Bill. Also, the enforcement of the law was switched to the local governmental units from the Fire Marshal's Office, for the reason that the Fire Marshal in Illinois only has fourteen assistants to cover the 102 counties of the State.

"The Bill passed the House on April 29 by a vote of 100 to 12. It came out of the Senate Committee on May 21 with a recommendation to pass. It is hoped that it will be speedily enacted into law."

—Illinois Society for the Prevention of Blindness, Chicago, Illinois

Minnesota

"*Fireworks Banned in Minnesota.*—The legislature of the State of Minnesota passed an act prohibiting the use of fireworks after

this act becomes effective. Many civic organizations interested in accident prevention, sight-saving, health and public welfare, united to support the bill, directed toward protecting the life and limb of Minnesota's children. In spite of the considerable opposition, this bill was successfully passed by the legislature to take effect August 1, 1941, and should go a long way toward reducing the amount of blindness caused by the preventable Fourth of July accidents.

"Minnesota has set an example which other states could do well to follow."

—*Minnesota State Department of Health, St. Paul, Minnesota*

"*Activities to May 1, 1941*.—The Minnesota Fireworks Control Law is a good one, and goes into effect August 1, 1941. Its passage has been so close to the heart of the State Society for the Prevention of Blindness that we feel responsible for getting it through, although innumerable other groups participated.

"The educational program has continued with P. T. A. meetings, articles published in rural newspapers, radio interviews, and a speaker, Dr. William O'Brien of the Medical School of the University of Minnesota, at the State Conference of Social Work in May.

"Cash prizes have been offered for posters on 'Care of the Eyes' made by members of 4-H Clubs of the state. Prize-winning posters will be exhibited at the State Fair. Provision for vision testing for club members will be a feature of our work in the 4-H Building.

"During the summer the Society plans to send an ophthalmologist, two nurses, a medical social worker, and a clerical assistant to a selected county to make a survey of the eye conditions of all children in that county. With the results of this survey as an index, the Society will urge the organizing of county chapters to facilitate plans to meet local needs in conservation of vision.

"Registrations for the summer course for nurses to be given with the co-operation of the National Society are now being taken by the Department of Preventive Medicine and Public Health of the University of Minnesota."

—*Minnesota Society for the Prevention of Blindness and Conservation of Vision, St. Paul, Minnesota*

New York

"An Institute on Conservation of Sight was held in Utica at the Hotel Utica on May 1 and 2. The Institute was arranged by the New York State Commission for the Blind, through its Prevention

Service, and in co-operation with the Central Association for the Blind of Utica.

"This Institute brought before the educational, health, and social welfare groups of the community some of the means through which sight might be preserved and also explained the relationship of the various agencies within the State concerned with the prevention of blindness. Through this medium an increased interest was stimulated in the conservation of sight. Members of professional and lay organizations as well as the general public attended.

"An address of welcome by the Honorable Vincent R. Corrou, Mayor of the City of Utica, opened the Institute. 'How the Eyes See' and 'Public Health Measures Which Safeguard Sight' was offered by members of the medical profession. At the dinner meeting 'The Responsibility of the State to Prevent Blindness' was discussed by Commissioner of Social Welfare David C. Adie, preceded by an ophthalmological presentation of 'The History of the Sight Conservation Movement.'

"The program concluded with a luncheon at which 'The Art of Illumination' was demonstrated, and health measures in industry were discussed by experts in their fields."

—*Prevention of Blindness Service, Bureau of Services for the Blind, New York State Department of Social Welfare, New York, N. Y.*

South Carolina

"South Carolina passed legislation in 1939 making it mandatory to instill a prophylactic in the eyes of new-born infants. It then became necessary to have new birth certificates in order that there might be a designated place for recording this function.

"The State Department of Public Health has co-operated in every respect with the Division for the Blind, and in consequence we have been permitted to review all birth certificates. The medical social worker has just completed reviewing all certificates which have been compiled this year.

"It was noted that many old certificates were still being used. A complete report of our findings was submitted to the State Department of Public Health. This included names of counties in which old certificates were being used, names of the midwives using old certificates, and names of midwives failing to record the use of a prophylactic.

"As result of these findings, the Health Department will make every effort to collect all old certificates. The midwives who fail to properly fill out the certificates will be reported to their respective county unit, who will contact them and see that they are supplied with new certificates, and further instruct them in the filling

out of these. In the event they continue to fail to co-operate in this respect, their license will be revoked.

"The Health Department has been forwarding the Division all cases of ophthalmia neonatorum which have been reported to them. These cases have been followed up, and in instances where the treatment was not being given, arrangement was made for the necessary treatment.

"We are delighted to note that since the passage of the above mentioned legislation there has been a gradual decrease in the number of cases of ophthalmia neonatorum reported. We cannot be too optimistic about this, however, as we realize there are probably many cases which are never reported, so we do not dare let up in our effort to locate these cases.

"In studying the medical reports which continue to come in, we note an increase in cases of blindness resulting from syphilis. All these cases are referred to their respective counties with the request that the client receive antiluetic treatment, and Wassermanns be made on members of the family. The Department of Public Health also co-operates in these services.

"The Division for the Blind has been responsible for 94 operations since the beginning of our new year, July 1, 1940. We plan to forward a report on these when we submit further material."

—Division for the Blind, State Department of Public Welfare, Columbia, South Carolina

Tennessee

"*Sight Conservation Activities In Tennessee From February 14, 1941, to May 12, 1941.*—During this three-months' period five of our Lions Clubs have begun co-operative programs in sight conservation with the Service, four being visual corrective programs for indigent visually handicapped children and one being a sight-saving class program. The clubs beginning visual corrective programs are: the Hartsville Club of Trousdale County, the Murfreesboro Club of Rutherford County, the Erin Club of Houston County, and the Decatur County Lions Club. The Chattanooga Club has begun work on a sight-saving class project, this class to be established in September of this year in Chattanooga, and has agreed to pay for the training of a teacher for this class, as well as to provide the necessary equipment.

"During this period 72 persons, 58 being children and 14 being adults, have had varying amounts of sight restored to them in one or both eyes, 66 of these restorations being accomplished by glasses alone, 5 by surgery and glasses, all being adults, and one by surgery alone, being a child. Seven other persons, 4 being children and

3 being adults, have had cataract surgery to restore sight, 5 being for congenital cataracts and 2 being for senile cataracts, but the amount of sight restored to these persons is not yet known.

"Also, total or partial blindness in one or both eyes either has been or is being prevented for 37 persons, 33 being children and 4 being adults. The causes from which blindness either has been or is being prevented in the cases of the children are: amblyopia exanopsia, with high hyperopia or myopia in 29 cases; trachoma in 1 case; traumatic iritis and secondary glaucoma in 1; and possibly progressive myopia in 2; and in the cases of the adults: 2 from pterygia by surgery; 1 from corneal ulcer by local treatment and the extraction of infected teeth; and 1 from diabetes by treatment.

"Seven talks have been made by the Director, one before a group of senior medical students at Vanderbilt University on 'The Causes of Blindness in the State and Their Prevention' and six on co-operative programs in sight conservation for Lions Clubs, before the Lions Clubs of Murfreesboro, Decaturville, Erin, Memphis, Knoxville and Greeneville, and the results have been most gratifying, since three of these clubs have begun visual corrective programs with the Service. Two others, the Memphis and the Greeneville Clubs, have agreed to begin visual corrective programs and the Knoxville Club has agreed to place before its Board of Directors a project for the establishment of a sight-saving class for Knoxville. Plans are being made to visit all of our sixty-four Lions Clubs as quickly as this can be done, and it is hoped that each of these clubs will adopt either a visual corrective or a sight-saving class project."

—*Sight Conservation Service, State Department of Public Health, Nashville, Tennessee*

Note and Comment

New Experiments Reveal That Fear and Rage Affect Vision.—Confirming the belief that rage or fear can "blind" you, Dr. E. I. Strongin, Mrs. N. Bull, and Dr. B. Korchin of the College of Physicians and Surgeons of Columbia University, have recently shown that vision is not the same under emotional strain as it is when one is relaxed. Motion pictures taken of the eyes of persons reading showed that, while 36 per cent of them could see better when emotionally roused, 22 per cent became worse under the strain. Even more critical was the test for binocular function; from 14 per cent to 22 per cent of those tested became worse under stress of emotion, while only four per cent improved under the excitement. The test of how the two eyes work together is particularly important with regard to the motorist who is trying to gauge the speed of an approaching car, or for the airplane pilot who, returning from an exciting and fatiguing flight, tries to land his speeding plane in a small field.

The scientists recommend that men whose duties will require them to use their eyes under powerful emotional strain, as in fighting or any hazardous situation, should have their vision tested under emotional conditions rather than in the quiet of a doctor's office.

Industrial Workers and Artificially Lighted, Windowless Buildings.—Artificially lighted, windowless industrial buildings, designed for "blackouts" in case of war, if equipped with great care need have no harmful effects on the eyes of workers, nor should they produce any significant tendency to claustrophobia (fear of being shut up in a confined space), *The Journal of the American Medical Association* for November 30 says, in answer to an inquiry.

"The long time use of artificial lighting to the exclusion of all natural light may have a harmful effect on the eyes of workers," *The Journal* says, "but foremostly because of the inadequacy or unsuitability of the artificial lighting provided. Until recently there has been no form of artificial lighting that compared favorably with

daylight. Even now statements as to parity must be accepted with reserve. However, with the advent of fluorescent lighting, with high intensity, absence of glare and a minimum of disturbing shadows, it is now possible to meet all the visual requirements of daylighting, but while artificial illumination may be made the equal or even the superior of daylight in selected enterprises, such as department store work, it should not be inferred that all the beneficent purposes served by sunlight are met.

In discussing the possibility that windowless factories might cause claustrophobia among workers, or might predispose the workers to panic in case of air raids, *The Journal* declares: "Current comment on windowless air-conditioned work places implies that such structures are radically new. Overlooked is the fact that most theaters are windowless, ventilated or air-conditioned creations and that the counterpart of a windowless ventilated factory can be found in any mine. It is common experience that claustrophobia is not of common occurrence among theater patrons. On the other hand, few persons enter a mine or descend into a well without some anxiety. Certainly the mild apprehension which is the lot of most persons confronted with strikingly unusual physical surroundings cannot be regarded as significant. On moving into any new factory or office quarters of the windowless or opaque glass tile type of structure, fair numbers of all employees become more aware of air conditions, lighting and odors. Usually these mild states are transitory and unimportant. When the anxiety is severe or prolonged, adequate inquiry ordinarily will establish causative connections wholly unrelated to physical surroundings."

Regarding the effect of working in windowless factories on the sickness rate of employees, *The Journal* says that it is improbable that any significant disease conditions could be created by this type of architecture.

Safeguarding the Vision of the School Child.—Because of the intensive visual work done in the classroom, it is imperative that the physical arrangements of schools have provisions for safeguarding the sight of the pupils, Constance J. Foster states in *Hygeia:*

"The more exacting the eye work, as in drawing and sewing

classes, the more illumination is required for ease of seeing," she says. "Adjustable tilt-top desks help to bring work to the proper angle of vision. The desk should be high enough to prevent stooping or slumping. Work held 13 to 15 inches from the bridge of the nose is easiest on the eyes."

Discussing eye care during convalescence, she pointed out that "during convalescence from any prolonged or serious sickness, the eyes are weak and in need of special protection from strain. Yet this is the time when the child is frequently given books to read or amusements that require close visual application. It would be wiser to encourage periods of rest for the eyes by reading aloud to the child or providing him with projects that do not overtax the already weakened nerves and muscles of the eye."

Book Reviews

A Treatise on Medicolegal Ophthalmology. Albert C. Snell. St. Louis: C. V. Mosby Co., 1940. 300 p.

If there is a branch of medicine deserving of special medicolegal consideration it is ophthalmology and no one seems as well equipped as or better able to present this subject than Dr. Snell. Interest in the forensic aspect of ophthalmology in this country was given its first impetus by Dr. Harry Würdemann, who, at the turn of the century, made frequent contributions to literature on visual economics. Subsequently enactment of federal and state laws to provide compensation, in the event of industrial diseases or injuries, played a big part in the interest developed in the legal side of casualties involving the eyes.

Appraisal of the degree of disability sustained in these cases presents some complex problems in that it depends largely on how much of the functional loss sustained can be attributed to the accident to which it was ascribed. To compute the actual loss a knowledge of the visual acuity prior to the accident must necessarily be available. However, this is not always to be had, inasmuch as a large proportion of employers fail to have visual tests of new employees made and the visual acuity of all employees recorded at regular intervals, thus offering an important weakness in the line of medico-legal defense. But even with the data of the pre-existing visual acuity available, evaluation of ocular disability presents problems which often appear incomprehensible to jury and judge or even to the examining oculist.

For example, it is not readily comprehensible that the difference in visual acuity before and after injury, estimated by the Snellen type test, does not represent the actual efficiency loss and that many circumstances must be taken into account. It would seem evident that the same significance could not be attached to the total loss of one eye in those engaged in menial occupations as to those in whom binocular single vision is essential to their vocations, as in tennis and ball players. It is also conceivable that such cases

when it applies to actors, public speakers, and those whose occupation brings them before the public, the loss of the eyeball would have a greater compensatory significance than would the loss of vision alone.

Much interest attaches to the casualty cases in which permanent injury to one or more of the extrinsic ocular muscles has deprived the injured of binocular single vision, incapacitating him from work even though vision in each eye remained normal. Evaluation of the permanent disability for the purpose of indemnification in such cases offers a very difficult problem. This applies also to cases in which defects in peripheric vision follow head injuries and central retinal perception is retained.

Such medico-legal questions and many others are given full consideration by the author. An interesting and valuable chapter is also devoted to the malingerer and the means of detecting efforts at deception. The work of Snell is well classified and in a readable way furnishes information which should prove of interest and value to both physician and lawyer.

—Adolph O. Pfingst, M.D.

Briefer Comment

Books for Tired Eyes—A List of Books in Large Print. Compiled by Charlotte Matson and Dorothy Wurzburg. Chicago: American Library Association, 1940. 80 p.

This volume, a third edition, brings up to date the list of books for adults and books for children printed in 12-point type or larger. As the compilers say in the preface, it "cannot include all the excellent books printed in large type, nor does it pretend to be a list of best books. It represents, however, a variety of interesting readable books, now in print, set up in good clear type, and chosen with a due regard for the varying tastes of readers. It is gratifying to see that the tendency among publishers is to print many more books in large, clear type than they did when the first of these lists was compiled in 1923."

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

351. Signs of Eye Trouble in Children. Two-color flyer listing behaviors that help discovery of visual difficulties. (75 cts. per C; $5.00 per M.)

352. Helping America by Saving Sight in Childhood—Through Child Welfare Services, Helen C. Hubbell. 12 p. 10 cts. Describes sight conservation activities of the Child Welfare Division of the Pennsylvania State Department of Welfare.

353. Helping America by Saving Sight in Childhood—Through Educational Service, Winifred Hathaway. 16 p. 10 cts. Discusses the relation of social work to the sight-saving class program.

354. Planning an Individual Reading Program for a Child in a Sight-Saving Class, Margaret Balch. 16 p. 10 cts. Emphasizes the need to adapt the reading program to the individual needs of the sight-saving class pupil.

355. Eye Protection Experience in Mining Operations, R. H. Seip. 12 p. 10 cts. Outlines the program of eye conservation followed for fifteen years in a mining industry.

356. Saving of Eyes in Industry—A Management Problem, F. H. Humphreys. 8 p. 5 cts. Presents the part management plays in the development of an effective goggles program.

D143. Care of the Eyes and the Prevention of Blindness, U. S. Public Health Service. 4 p. ($1.00 per C; $7.50 per M.) Briefly outlines measures for protection and care of the eyes. Reprinted from *United States Health Reports*, August 9, 1940.

D144. Some Light on Lighting, Department of Agriculture. 4 p. ($1.00 per C; $7.50 per M.) Tips from experts on getting the most for your money in lighting. Reprinted from *Consumer's Guide* (U. S. Department of Agriculture), November 15, 1940.

Contributors to This Issue

Helen C. Hubbell is the supervisor of the Rural Child Welfare Division of the Pennsylvania State Department of Welfare, Harrisburg.

Mrs. Winifred Hathaway, associate director of the National Society, needs no introduction to readers of the REVIEW; she has written authoritatively not only on the subjects of sight-saving class work and general sight conservation, but on the subject of school lighting.

Mrs. Margaret Balch is a sight-saving class teacher at the Lapham School, Madison, Wisconsin.

A former contributor to the SIGHT-SAVING REVIEW, **R. H. Seip** is personnel manager at the New Jersey Zinc Company, Franklin, New Jersey.

F. H. Humphreys is assistant to the general superintendent of safety, the American Car and Foundry Company, New York City.

Book reviewer: **Dr. Adolph O. Pfingst** is professor emeritus in ophthalmology at the medical school of the University of Lousiville.

Tell-Tale Eyes*

A. L. Kornzweig, M.D.

THE author describes the eye as an indicator of conditions which affect the general health of the individual.

MOST people are surprised to learn of the great number of medical conditions that can be determined by an examination of the eyes. The average medical man looks at the eyes when he examines a patient. He limits himself to a few definite observations because he knows the value of those observations. The ophthalmologist, or eye physician, whose function it is to examine the eyes, looks for many more signs and symptoms which help him to make a diagnosis—not only of an eye defect, but of some general medical defect. In this sense, the eye examination is a part of the program of preventive medicine.

What the Doctor Sees When He Looks at the Eye

One important fact the doctor observes when he looks at the eyes without the aid of any instrument is the prominence of the eyeballs. Even a layman can tell you, sometimes, that the eyes look prominent, that they look bigger than they normally should. This apparent increase in the prominence of the eye is an important symptom of many conditions. Primarily, it may be partly congenital in nature—normal for that particular individual. There are many people who are so-called "popeyed," yet have no disease in the eyes or in the body. These individuals have what is known as shallow orbits, so that the normal eye is thrust forward slightly more than is usual. Or else, if they have a normal orbit or socket, the eye itself may be unusually large. Nearsighted eyes are large eyes, and many nearsighted individuals have prominent eyes. So the doctor has to determine whether the "popeye" is normal or abnormal.

* This is one of a series of talks on preventive medicine to the laity, sponsored by the New York City Board of Health.

The history of the patient helps us a little bit. If he reports that he was always that way, it is all right; but if he says that the "popeyes" came on in the last few months, then the doctor must discover the reason. When the condition is present in both eyes, the most common cause is exophthalmic goiter, or thyroid disease. A hyperactive thyroid causes an increase in the rate of metabolism and also stimulates certain muscles of the eye which produce this peculiar condition. Sometimes, when the "popeye" is one-sided, the problem may be different. In these cases, the prominence may be due to something in the orbit pushing the eye out. An article in the *Journal of the American Medical Association*, January 4, 1941, lists all the conditions that may cause "popeye" on one side. Without going into a detailed explanation, but merely to demonstrate the number of conditions that can cause a unilateral "popeye" they are: (1) exophthalmic goiter, a condition which usually causes bilateral, but may cause unilateral, protrusion of the eyeball; (2) orbital tumor; (3) hyperostosis (increase in the bony structure); (4) hemangioma, which is a blood-vessel tumor; (5) xanthomatosis; (6) congenital defect of the orbit; and (7) cavernous sinus thrombosis. Of course, these names are merely words to the layman, but they are conditions which are kept in mind when the doctor sees such a patient.

What the Eyelids Disclose to the Doctor

A patient not infrequently seen is one who has what is known as a drooping lid—one eyelid will come down a little farther and cover the eyeball a little more than that of the other eye. This also means something to the observant physician. I am not referring to a local eye condition that may cause a swelling of the lid, *i.e.*, an inflammation, but rather to the general medical conditions that may cause such a drooping. The eyelid is supplied by certain nerves which control its function—the opening and closing of the eyes. If these nerves are not normal, the drooping eyelid may occur. There are two very well-known general conditions that manifest themselves this way: one of these is syphilis of the central nervous system; the other, a condition known as *myasthenia gravis*. A famous example of a victim of the first condition is the poet, Heinrich Heine. He had to raise his lids with his fingers in order to see the person to

whom he was speaking or the words he was writing. This occurred in his later years. Happily such conditions occur much less frequently now that syphilis is usually recognized early and treated before it attacks the central nervous system. *Myasthenia gravis* is a condition whereby the general musculature of the body becomes weak, and the eye muscles may be the first indicators of that condition. A cure for this condition, as well as for the better known disease, syphilis, is known. When it can be detected early, the cure has a much better chance of being effective.

The Doctor Looks at the Pupils

We shall now examine the pupils of the eye. The pupil is the black spot in front of the eyes through which light enters into the interior of the eyeball, and through which we see. Conditions affecting the pupil are, therefore, of great importance to us. The pupil is by far one of the most important indicators in the eye that we have. The pupil acts as a shutter, getting bigger in dim light and smaller in bright light. The ability to react to light is important, and, as may have been noticed, whenever a doctor examines the eyes, he flashes a light into them. The purpose is not only to see what the eye looks like, but also to test the reaction of that eye to light, which is indicated by the shutting down of the pupil. This reaction is what every doctor looks for. The normal pupillary reaction may be missing in some general diseases of the body, notably syphilis. The pupil is fixed to light. It will not react. If the patient looks at an object near by, or accommodates, as we say, the pupil will contract. This peculiarity of the pupil not to react to light, but to react to accommodation, is known as the Argyll Robertson pupil, first discovered by this physician, and is one of the first indicators of syphilis of the central nervous system. But one must not be fooled by this sign. There is a condition known as Adie's syndrome, in which the pupil will also contract very poorly to light. The important difference here is that the pupil will also react very poorly to accommodation. It is therefore necessary for the doctor to be wary of making too hasty a diagnosis of syphilis just on the basis of the pupil's reaction to light.

Then, there is an inequality of the pupils. One pupil will be

larger than the other. This is not normal either. Where it is found, it is important to look for other signs of a condition known as Horner's syndrome, which is due to a disease of the sympathetic nervous system. Suppose a doctor looks at a person's eyes and finds that the pupils are pinpoint in size (by that we mean that they are contracted to the very smallest degree). Several things may cause this condition. The patient's eyes may have had drops which are used in the treatment of the eye disease known as glaucoma. Or he may be a morphine addict—a classical sign of morphine addiction is pinpoint pupils. Still another condition is syphilis, but in this last case the pupils are usually irregular, small, and different in both eyes. Of importance in negligence cases, automobile accidents, and such, is the condition of the pupil at the time of the accident and immediately after. The first signs of concussion of the brain are irregularities in size of the pupils and in their response to light. Thus one can see how much can be learned by the simple procedure of throwing a light into an eye.

Sometimes a patient comes to the doctor and says he sees double. What does that mean? Every object in some part of his field of vision, or in all parts, is duplicated. And as the doctor looks at the eyes, he finds that they are not parallel. One eye is turned in or out, up or down. Each eyeball has attached to its sides six muscles, the purpose of which is to rotate the eyeball in all directions: upwards, downwards, sideways, inwards, and outwards. All these muscles must work in harmony. When the eyes turn to the right, the muscles which are on that side contract—the opposing muscles on the left side of the eyeball relax. This means that there has to be a guiding point—a central intelligence which controls all these six muscles. By central is meant some area in the brain which is a driver, and which sees to it that the muscles work and act in harmony. I am sure you all must realize the difficulty that would be entailed in trying to get a team of six horses to work together. Now try to imagine two teams of six horses that must work in absolute harmony for perfect functioning. Suppose one of these muscles were weak, or paralyzed, as we say, and could not function. In this condition the eyes are no longer in alignment. Anyone having such a disease is conscious of the fact that he has two eyes, something those with normal eyes are not usually aware of, since

both eyes act as one. Each eye gets one image, but the brain fuses these images. Fusion occurs, however, only when these images fall on corresponding points in the back of the eye. This can happen only when the eyes are perfectly parallel and in alignment. As soon as the eyes are not in alignment, the images received are no longer at corresponding points, and the mind is unable to fuse those two images into one, and a double image results. The doctor must determine what has caused the condition. There are several medical conditions that might account for this. Diabetes is a common cause. Syphilis is another, brain tumors a third, orbital tumor a fourth, inflammations in the brain, such as meningitis or encephalitis, a fifth. Diseases of the spinal cord may produce the symptom. In several cases, where certain drugs have been injected into the spinal cord, a paralysis of the eye muscles has resulted. Injuries to the skull, concussion or fracture may cause the condition. The earliest sign, very often, is diplopia. A patient may not complain of diplopia because he still has sufficient strength in his muscles to bring about an alignment, even though the action of one may be weaker than the other. In these cases, diplopia can be brought out by one of several methods, the simplest of which is to cover one eye of the patient with a red glass. The difficulty of fusing two objects of dissimilar color very often is sufficient to uncover the diplopia due to a muscle that is weak but not fully paralyzed.

The Effect of Vitamins

There has recently been considerable talk about vitamin deficiencies and their manifestations. Certain vitamin deficiencies show themselves exclusively by disturbances of the functions and appearance of the eyes. Night blindness is a condition characterized by the inability of the individual to see well at night. He can see perfectly well in the daytime, when the illumination is sufficient; but as soon as the illumination is cut down, he is unable to get around with any degree of comfort. Such a condition may be due to several causes. It may be an hereditary condition, which has been passed down from father to son; it may be due to an inflammatory condition; a disease in back of the eye; or it may be due to a deficiency of Vitamin A. The question of night blindness has been

given considerable discussion and importance, because accidents that occur at night have long been thought to be due to a possible defect of this kind. However, the experimental work that has been done to produce Vitamin A deficiency in man has shown that, in order to have such a disease, the deficiency must be severe, protracted, and prolonged. It is very seldom that such a condition will occur under ordinary circumstances of living in this country. People who drive cars usually ingest a sufficient amount of fat to prevent Vitamin A deficiency.

Then there is Vitamin B deficiency, which sometimes shows itself by an increased vascularity of the cornea. This is a rather recent finding, the importance of which has not yet been fully evaluated. In the southern communities of the United States, where pellagra exists to a greater degree than in the northern section of the country, it has been found that certain conditions of the eyes are greatly helped by the administration of riboflavin, which is part of the Vitamin B complex.

The Relation of the Eye to the Brain

The human eye has sometimes been called a cerebral eye. This means that the eye is considered to be part of the brain, and it has been shown by a study of the development of the eye from its earliest appearance in the embryo that it is really an outpocketing of the brain. The nerve that goes to the eye and supplies the retina, which is the innermost lining of the eye, also goes backward to the brain. It crosses partly at a point known as the optic chiasm and then goes backwards to the posterior part of the cerebrum, where it finally terminates in the occipital lobe. In other words, visual impressions are obtained in front of the face through the eyes, but we really see with that portion of the brain which is in the back of the head. The nerve must traverse this entire distance; and it can readily be seen how disturbances anywhere along its course may cause some interference with vision. There is a method of examination which will detect defects in parts of the visual field. Each eye has a very wide field of vision. If a person looks straight in front at an object, without turning his head or his eyes, he can see his fingers move at the side or above or below. This is known as the field of vision. The sharpest vision, of course, is that which is

directly in front—the central vision. Certain diseases will affect the central vision, and others will affect the peripheral, or side, vision. We have instruments known as perimeters which show up these defects. A brain tumor may cut off half of the field of vision of both eyes, and leave the other half entirely intact. A hemorrhage in the brain can do a similar thing. Poisonings by arsenic, lead, methyl-alcohol, and so forth, will cut down the central vision but will leave the peripheral field of vision intact. Even a vitamin deficiency, especially of the Vitamin B_1 type, will show itself by a central defect. This may be cleared up completely by the administration of thiamin chloride, which is purified Vitamin B. All of this helps to prove the intimate relationship of the eye and the brain. As a matter of fact, the neurologists, who specialize in diseases of the brain, as well as the eye doctors, know how to study the fields of vision because it is so important an aid in diagnosis.

All these conditions are things which are picked up, if present, by the ophthalmologist when the eyes are examined. Sometimes the patient comes first to the oculist or seeks medical aid because of eye symptoms. From there, the patient is referred back to the general medical man or neurologist for further investigation and study.

The Retina as an Indication of General Health

There is still another part of the eye where the eye doctor learns considerably more about the general condition of the patient than anywhere else in his examination. This part of the eye is called the retina. It is the innermost lining of the eye, as has already been mentioned, and is that portion which first receives the light stimulus, which is transmitted back to the brain. It is in this region that the blood vessels are seen in actual operation. Nowhere else in the body can the small arteries and veins be seen so readily, and any disease that affects them is certain to affect the blood vessels of the rest of the body. Hence, what we see in the back of the eye can tell us more about the general health of the patient; and in certain cases we can even prognosticate the life expectancy from the appearance of the retina.

High blood pressure, even in the early stages, can be diagnosed by the appearance of the retinal arteries. Headaches which are

attributed to the eyes often bring a patient to the eye doctor for the first examination. When the condition of the blood vessels is seen in the fundus of the eye, the patient can then be referred back to a medical man for proper care. Diabetes shows itself in the eyes by the appearance of little pinpoint hemorrhages. Anemias, either secondary to other conditions or the primary pernicious type, and other blood diseases, such as leukemias, give their tell-tale evidence in the fundus. The pallor of the background of the eye, plus hemorrhages and exudates due to weakened blood vessels, are seen in the retina. Numerous brain conditions, such as tumors, inflammations, and abscesses, will cause a swelling of the nerve head. This is of great diagnostic importance. Diseases which destroy the nerve can be noted by the pallor or atrophy of the optic nerve. Probably no part of the eye is regarded with such interest by general practitioners, as well as by eye men, as the retina. Recently, pictures of the back of the eye have been taken in natural colors, aided by the advances in photography, and these pictures are invaluable sources of information as to the progress of disease, and for the instruction of people vitally interested.

It can truly be said that the eyes tell a story, which, to the initiated, is full of meaning, and from which a wise patient benefits greatly.

Helping America by Saving Sight in Childhood, Through Health Services*

Roger E. Heering, M.D., M.P.H.

PRESENTS the responsibility of official and voluntary health agencies in the conservation of vision movement and points out what already has been accomplished through health services.

IN primitive man's struggle for existence he was very dependent upon the acuteness of his olfactory and auditory senses for his very survival. They warned him of danger and advised him as to whether to flee or whether the menace was within his capacity to handle. Today the tables are turned. Modern man is more dependent on his vision than on any other faculty and, as Dr. Brewster, of New Orleans, has said, "Next to death, the greatest tragedy befalling a human being is blindness."

Our job as members of official and voluntary health agencies is to apply the knowledge that science has given us to preserve the vision of our fellow men and to make provision that future generations may be equipped with normal faculties so essential to modern living.

Causes of Blindness

Much of the economic loss and human disability due to blindness is a monument to the deficiencies in public health and medicine. Brewster says that 73 per cent is a conservative estimate of the proportion of blindness in Louisiana that could have been prevented. This figure is probably very nearly applicable to the United States as a whole.

Dr. Harry Best, in a recent *Survey Midmonthly*, stated that fortunately not less than three-fourths and perhaps nine-tenths of

* Presented at the National Conference of Social Work, Atlantic City, N. J., June 2, 1941.

blindness is preventable—that it is the easiest of all human defects to reduce in incidence, and that its greatest cause is disease; another, accidents. Most cases resulting from these causes could have been prevented. He adds that a small proportion of blindness is of a hereditary character, not so fully understood, and not so easily conquered.

A report on the causes of blindness for the school year 1938–39 in schools and day classes for the blind, which was prepared by the Committee on Statistics of the Blind, yields some interesting data. This report classifies 3,868 cases as to cause. Among these children, 1,882, or 48.7 per cent, are placed under the heading, "Prenatal Origin." Of these 1,882 cases, heredity was reported as established in 60; presumed, in an additional 439; and the remaining 1,383 of the 1,882 cases were of prenatal origin, but the cause was not specified. Infectious diseases accounted for 23.8 per cent of the cases and trauma accounted for 8.5 per cent, most of which occurred during play or sport.

General Diseases

General diseases, such as diabetes, nephritis, vascular diseases, diseases of the central nervous system, etc., were incriminated in 1.7 per cent. The control of some of these diseases means the prevention of acute conditions which may have as their sequelae degenerative processes which may involve the visual apparatus and its appendages.

With reference to neoplasms, which reportedly accounted for 2.8 per cent of the cases in the study, considerable encouragement could be derived from Dr. L. A. Scheele's paper, read before the New England Health Institute last April. Dr. Scheele indicated that definite progress was being made in the field of cancer control, which is indeed encouraging.

Nutrition

Nutritional deficiency was not reported in this study as an important cause of blindness and was included in the category of general diseases. Less serious cases of visual impairment due to nutritional deficiency are undoubtedly much more common among children than these figures on causes of blindness would imply. In

spite of the fact that in recent years almost every purveyor of prepared foods and medicines has done much to make a farce of nutrition, and especially the vitamin question, the fact remains that there are dietary requirements which are essential to the normal development and function of the human organism. Incidentally, recent investigations reveal that conditions once thought to be the direct result of disease entities are due not to that entity *per se*, but to the effect of the disease on the assimilation and synthesization of certain factors that the body cannot successfully do without. For example, it has been shown that chronic alcoholism destroys the protein-digesting activity of certain gastro-intestinal enzymes, and it has been suggested that alcoholic polyneuritis may be caused, in part at least, by faulty digestion and assimilation of food resulting from the destruction of digestive enzymes by large quantities of alcohol taken over a considerable period of time.

I suspect that visual difficulties in children are more commonly attributable to dietary deficiencies, or, to be more specific, vitamin deficiencies, than has been reported. Most reports on ariboflavinosis, or the condition due to lack of the vitamin B complex, are concerned with the disease in adults, but Spies, Bean, Vilter, and Huff found that it occurs in any age group. From their studies among undernourished children in the South, they are convinced that lesions characteristic of the disease are more common than those of any other deficiency syndrome. In this condition, ocular involvement in the nature of conjunctivitis and keratitis are not uncommon.

In vitamin A deficiency we see night blindness due to the interference with the regeneration of visual purple in the retina. Dryness of the bulbar conjunctiva and softening of the cornea, which, if not corrected, may go on to keratitis and ulceration, may also result from insufficient vitamin A. Thus, it is evident that dietary factors must be re-emphasized in any program for the preservation of vision.

Although synthetic vitamins are proving useful in building and maintaining health, vitamins obtained from natural foods furnish cheaper, more palatable, and better balanced reinforcements. As Surgeon General Thomas Parran points out, "the coarse food dispensed to paupers in an English almshouse a century ago was rich

in vitamin B. Excellently nourished are the peasant peoples, whose primitive diet is whole grain bread, thick vegetable stews and plenty of milk and cheese. Their children are rosy-cheeked and vigorous, with strong teeth."

What happens when the needed elements are not supplied is vividly shown in another comment by Dr. Parran: "When I made my first trip to Denmark in 1926, I went to visit a home for blind children. Most of the youngsters from 12 to 16 years old were totally blind from a nutritional disease which appears when vitamin A is lacking for a long time from the diet. Since butter, cream, and cheese are rich in vitamin A, I asked my host how this could possibly happen in Denmark, which for centuries has been the dairy land of Northern Europe. He answered me bitterly, 'We sold their eyes abroad with the butter. During the World War we knew little about food except in terms of calories. We shipped out our dairy products and fed the children substitutes. Now they pay the price of our greed and ignorance.'"

Infectious Diseases

Of the infectious diseases causing blindness or visual impairment among children, ophthalmia neonatorum and prenatal syphilis, or syphilis acquired *in utero*, head the list. Dr. Charles E. Stanford, of Minnesota, has related that the corneal scars of ophthalmia neonatorum should be a thing of the past as there is practically no excuse for the disease to occur.

Unfortunately, there are variations in the interpretation of what constitutes a case of ophthalmia neonatorum. In some states the term is interpreted to include any indication of inflammation of the eyes in the newborn from whatever cause. In other states the term is interpreted to include eye infections of any type and chemical irritations. The term is interpreted to include only infections of the eye in others, and in still others, ophthalmia neonatorum means only gonococcal infection of the eyes.

Probably 60 to 70 per cent of frankly purulent cases of ophthalmia neonatorum are of gonococcal origin. In 1879, Crédé introduced as a prophylactic the use of a solution of silver nitrate into the baby's conjunctival sac immediately after birth. The good results of this method are such as to justify criminal proceedings

upon those who fail to apply it in every case. Forty-five of the 48 states, and the District of Columbia, have a law or health department regulation requiring the use of a prophylactic for prevention of ophthalmia neonatorum. In 15 of these there are limitations in the law or regulation which does not make the use of the prophylactic mandatory if the parents object, or the law may require the prophylactic only where infection is suspected, or only in births in hospitals and maternity homes, and those attended by midwives.

Although not usually included in the provisions of the law for prevention of ophthalmia neonatorum, it is customary to include in the birth certificate a question concerning the use of a prophylactic in the eyes of the newborn. Thirty states include this type of question in the birth certificate.

All of the states have laws or health department regulations requiring the reporting of cases, but in 11 states the laws or regulations are so qualified that they do not cover all cases. The objective there is to insure early treatment, which is possible only if notification is prompt.

Crédé's method, though one of the triumphs of preventive medicine, does not strike at the root of the evil. To prevent gonorrheal ophthalmia, it is much better to try to eradicate gonorrhea from men and women, as we are trying to do today, than to drop silver nitrate into babies' eyes.

In the study of causes of blindness among children, 4.8 per cent of the cases had been attributed to prenatal syphilis by the examiners. However, this figure is believed to be an understatement, since it is difficult to determine the exact etiology in many of the cases in which the syphilis itself is no longer in an active stage, and some of the examining ophthalmologists in the schools for the blind still hesitate to attach this label to the child.

The source of prenatal syphilis is the mother—in other words, the infant acquires the disease *in utero*, and, as far as we know, this transmission of the *Treponema pallidum* from mother to unborn child usually takes place some time during or after the fourth month of pregnancy.

The child is often born with good eyes and evidence of syphilis either in the eyes or elsewhere may not be apparent. It is usually not until after the fourth year, and more commonly between the

fifth and sixteenth year, that interstitial keratitis becomes evident. Then the battle begins to try and save the eye from serious and permanent damage.

Interstitial keratitis is but one of the stigmata of prenatal syphilis that may be manifested by the congenital syphilitic. We ask ourselves why this blight upon the innocent when we have had the weapons of prevention for all these years. Our doctors are ready enough to report a case of smallpox and are more readily notifying the authorities of cases of open tuberculosis, but being human, they have shrunk from suspicioning that their patients might be tainted with syphilis. Consequently, as De Kruif says, "with no chance to know or to forfend it, mothers pass spirochetes through their blood to their unborn children, so that these babies are born dead before their time. Or, a mother may be so happy to give the world what seems a healthy baby who within a month begins to sicken, only to die before it speaks its first baby talk or begins to toddle. Worst of all, so patient is the syphilis spirochete that a boy or girl may grow to high school age, husky and brilliant in studies, with never a sign or outward hint of syphilitic sickness; then such a boy, pride of his mother, or girl, apple of her father's eye, may sicken, go insane with the terrible dementia called juvenile paresis.

"Or in others, the promise of fine careers may be blasted by a cloudiness, a curious veil, that forms slowly over the adolescent's eyes. For ten, fifteen, twenty years after a child is born from its unsuspecting mother, the evil spirochete will wait to strike him down with serious damage to vision or even blindness.

"Such are the perils of syphilis to the innocent."

Interstitial keratitis, referred to in the latter portion of De Kruif's quotation above, is but one of the more common causes of visual impairment in congenital syphilitics, optic nerve damage running a close second.

Legal Measures

Fortunately, rather than wait for physicians and the public in general to awaken to its responsibilities, many states have taken steps which will provide an effective means of reducing the incidence of prenatal syphilis. We see these steps in the passage of

prenatal laws which require the expectant mother to have a blood test, and in the passage of premarital laws requiring that before a marriage license can be issued, one or both of the prospective partners must present competent evidence of freedom from syphilitic infection.

To date, 25 states have passed legislation designed to prevent the spread of syphilis through marriage by requiring that both the prospective bride and groom submit to examinations, including a serological test for syphilis, before the issuance of a marriage license, which is refused to those in whom the disease is or may become communicable. Twenty-four states are now seeking to prevent prenatal syphilis by requiring physicians or midwives in attendance upon expectant mothers to see that they have blood tests taken promptly so that maternal syphilis may be detected early enough to allow preventive prenatal antisyphilitic treatment.

The first law requiring a premarital examination and blood test for syphilis of both partners was passed in Connecticut in 1935; during the following two years, five states passed such legislation. The next year three more states were added, the next year, nine states; in 1940, six, and in 1941 to date, one more. The first legislation requiring prenatal blood tests was passed in 1938 in New Jersey, New York, and Rhode Island. In the year following, similar legislation was passed in 14 more states; during the past year, in five additional states; and 1941 to date, two states. That these laws will have a great deal of influence in helping us with the problem of preservation of vision or prevention of blindness cannot be denied.

As in the case of the use of a prophylactic in the eyes of the newborn, state health departments are beginning to incorporate into the birth certificate a question regarding the prenatal blood test of the mother for syphilis. For example, New Jersey asks the question, "Was a blood test for syphilis made?", and the date of the specimen is placed on the birth certificate, in order that the data obtained may be used to stimulate an examination and treatment early in pregnancy if necessary.

To prevent blindness and visual impairment due to the venereal diseases there must be more, however, than just legislation. In addition, adequate venereal disease control programs are needed,

with official agencies working in close harmony with voluntary agencies. If success is to be attained, there must also be wholehearted co-operation on the part of the private physicians.

In view of the availability of a new and effective treatment for gonorrhea, provision is being made for expanding the venereal disease program to include gonorrhea control.

I have mentioned some of the legislative health measures which are either directly or indirectly important from the viewpoint of the conservation of sight. Other public health measures which have been incorporated into state laws or regulations, such as compulsory smallpox vaccination and communicable disease control regulations, especially trachoma, are also important prevention of blindness measures, although time does not permit our mentioning these in detail. I think it is also auspicious to mention the Act of July 9, 1918, under which was established an Interdepartmental Hygiene Board composed of the Secretaries of War, Navy, and Treasury, and setting up a Division of Venereal Diseases in the United States Public Health Service. Under this Act, states adopting standards set up by the Public Health Service could receive allotments of Federal funds for venereal disease control activities. This original Act was added to by the Act of May 24, 1938.

The Social Security Act and Sight Conservation

The Social Security Act, approved by the President on August 14, 1935, provides for grants to states for maternal and child welfare under Title V; and Title VI provides for grants for public health work. Both Titles V and VI allow assistance to states to enable them to augment or establish facilities designed to improve public health services, and those activities which will be effective in the preservation of vision should be included.

The Social Security Act and the Venereal Disease Control Act provide the wherewithal and the stimulation for better public health methods, which are important whether we are concerned with the preservation of sight or the control of tuberculosis.

Another section of the Social Security Act (Title X) deals with aid to the blind on the basis of need. A desirable extension of that provision would be one allowing federal grants to any state, contingent upon the inauguration and carrying out of a restoration of

sight program for the blind and measures for the prevention of blindness. Such a procedure would be invaluable. It would give substantial impetus to the development of a vast campaign for the prevention of blindness which could not avoid considerably reducing the economic burden upon the public treasuries. There could hardly be anything more effective in bringing the states to the realization of their responsibilities in this matter.

Preschool and School Eye Examinations

For the discovery of the individual child with eye difficulty we are dependent upon preschool examinations and school medical inspection procedures. For the solution of these problems we must rely upon the leadership of health and school authorities, and also upon the voluntary agencies which provide the stimulation, co-ordination and education essential to any health program.

Impaired eyesight is one of the commonest defects which stand in the way of a child's development and education. The earlier the defect is discovered, the sooner can be instituted investigation to determine the cause, which in turn will indicate methods of correction or prevention of further disability. Where the defect is of prenatal origin or due to a birth injury, it is possible to place responsibility upon the attendant at birth, for reporting the case to the health officer. This is another instance in which the birth certificate, or a supplemental form accompanying it, is being used to elicit the desired information. (As of January, 1940, twenty states were requiring reporting of congenital defects. Later figures on this point are not available.)

It is important that arrangements be developed for the ascertainment of defective vision in children of preschool age. Health centers for maternal and child welfare can be effective along these lines. Unfortunately, few of these services include careful vision tests at the present time, although it is well known that an adequate test can be made for children as young as three years.

In the case of school children the most important means of ascertainment of defective vision lies in the school medical inspection. Most states (41) have legislation for medical inspection of school children, although this is mandatory in only 21. The efforts of the school physician and nurse can be made effective only

through the active co-operation of the teachers. The teachers, with their opportunity of daily contact with their charges, are in a better position to detect symptoms pointing toward special sense defects than is either the school physician or nurse who sees the children only when there is need for special attention. For this reason it is highly desirable that there be incorporated into the curricula of teacher training institutions more information concerning eyes and an opportunity to acquire adequate techniques of vision testing and to learn to recognize symptoms which suggest the need for ophthalmological examination. A consulting ophthalmologist should be a part of the school health service, to insure adequate advice in instances of visual defects.

The successful care of children suffering from defective vision depends in large measure on the efficiency of arrangements for the follow-up of the individual children by school nurses. The nurses must keep in touch with children for whom glasses are prescribed to be sure that such glasses are actually obtained. The nurse should also see that children for whom periodic examinations have been recommended by the ophthalmologist attend the appropriate clinics and at the intervals advised. She should see, so far as she is able, that children for whom glasses have been obtained wear their glasses, and whether these children, through loss or damage, need new spectacles.

The visiting nurse, whether she be an agent of an official or voluntary agency, can do much, if she will, toward discovering visual defects in infants and young children and toward seeing that proper corrective steps are taken. The same applies to the physician in general practice.

In areas in which there is a special eye health problem among children, it is important that this problem be recognized and that adequate facilities be established to meet the need. An instance of this is the high prevalence of trachoma in the states of Kentucky, West Virginia, Tennessee, Missouri, Arkansas, Oklahoma and certain sections of Illinois, Indiana and Ohio. Following the proof by the U. S. Indian Service of the value of the sulfanilamide compounds in treatment of trachoma, many of these states have increased their efforts to eradicate this disease as a cause of blindness.

In a paper of this type it is impossible to discuss at length even the essential features of a program for conservation of vision of children. For those who are interested, however, there is a wealth of material available from the various health, welfare and safety agencies. Let us prepare for the future, then, by insuring, insofar as our knowledge and experience will allow, the health and welfare of our children and of our children's children.

Bibliography

Best, Harry. "Next Steps for the Blind." *Survey Midmonthly.* Vol. 77, March, 1941.

Bigelow, Mason H. Foreword of *Eyes Right!* Annual Report of the National Society for the Prevention of Blindness, 1940.

Brewster, H. F. "Further Studies of the Causes of Blindness in Louisiana." *New Orleans Medical and Surgical Journal.* Vol. 93, March, 1941.

Edwards, Mary S. "Premarital Examination Laws in Operation." *Journal of Social Hygiene.* Vol. 26, May, 1940.

Johnson, Bascom. "Premarital and Prenatal Examination Laws." *Journal of Social Hygiene.* Vol. 24, November, 1938.

Kerby, C. Edith. "Eye Conditions Among Pupils in Schools for the Blind." A report of the Committee on Statistics for the Blind. *Outlook for the Blind.* Vol. 34, December, 1940.

National Society for the Prevention of Blindness. "Summary of Legislation on Prevention of Blindness." Revised annually. Mimeographed.

Stanford, Charles E. "A Study of the Blind." *Journal Lancet.* Vol. 61, February, 1941.

State and Provincial Health Authorities of North America. Committee on Conservation of Vision. "Prevention of Blindness from Ophthalmia Neonatorum." *Sight-Saving Review.* Vol. 9, June, 1939. National Society for the Prevention of Blindness, publication number 301.

Report of the Committee on Conservation of Vision, May, 1941. Part I. "A Progress Report on the Control of Trachoma." Mimeographed. To be published.

Helping America by Saving Sight in Childhood, Through Integration of Services*†

Theodate Haines Soule

"INTEGRATION is used to the end that the individual may have the fullest complement of sight possible as part of his equipment for life," says the author, and shows how the work of the departments of health, welfare, education, and other agencies are integrated to this end.

THE word integration means the formation of a whole from constituent parts, and we might look first, in a general way, at those parts which are needed to make up the whole of a program for saving sight in childhood.

Departments of Health

Let us begin with the program of state departments of health, which for a long time have been engaged in campaigns to prevent blindness by means of service, consultation, and education. The efforts directed toward the eradication of ophthalmia neonatorum have been, perhaps, the best publicized, but no less important are the activities planned to minimize the incidence of infectious diseases and the special programs for the control of tuberculosis and syphilis.

Causes of blindness have pointed the way to areas of prevention, and departments of health have begun to recognize and assume the responsibility for providing expert professional help through direction and consultation. Great strides have been made in the extension of the work of a health department by the development of county health units. County health officers and public health

* Presented at National Conference of Social Work, Atlantic City, N. J., June 2, 1941.
† Director of Social Service, New York Hospital.

nurses working in and out from these centers have been able to make direct application of preventive measures. Educational programs can be brought directly to the people for whom they were designed, and advice in nutrition and child care and attention to the needs of the preschool child have all contributed to saving the sight of children. Just how much this coverage means is thoroughly appreciated only by those workers who have been frustrated by its absence. It is one of the anomalies of our democracy that geographical location so frequently determines whether an individual can have the services supposedly offered to all of us.

Not under the health department of all the states, but in a large number of them, are the Crippled Children's Services which have been defined broadly enough to include, in many states, some eye conditions which lead to blindness. Diagnoses of congenital cataracts and other conditions likely to need surgical help are most commonly accepted, and it is encouraging to find that squint and trachoma are also included in some instances. This service means that medical and surgical treatment is arranged for, that glasses are provided, and that attention is paid to those aspects of aftercare which must be considered, if treatment is to be complete and successful. These include special educational arrangements, when necessary, vocational guidance, and help with problems brought about by the emotional factors which frequently affect the child and his family relationships, and which are inherent in any handicapping condition.

Departments of Welfare

A department of welfare has many opportunities, both on the state and local level, to participate in a concerted effort to save sight in childhood. Its major responsibility is planning and caring for those in need of public assistance and, as a corollary, the further responsibility of analyzing the causes which lead to a need for public assistance and for finding out what can be done to eliminate those causes. Blindness is one of the reasons why people are dependent, and a division for care of the blind in a department of welfare should be concerned with prevention as well as relief. Too often, however, the individual who comes to the attention of the division for the blind is beyond the stage where sight can be saved,

so that one expects the case worker in other sections of a department of welfare to be even more concerned with eye health in the families under her care. The provision for more and better opportunities for the care of children brought about by the establishment of state child welfare services, under the Social Security Act, has added another avenue of approach to saving sight. Under the provisions of the Act, child welfare services are concerned with the care of dependent children, not only in their own homes but in institutions. Lack of a well co-ordinated program with trained workers to carry it out has put many a visually handicapped child into the darkness of a school for the blind or shunted him into a county home, from which he may now be brought out into some measure of sunlight. The problem must be understood by the administrators, the supervisors, and the case workers. The county welfare worker, whether she be concerned with general relief, child welfare services, blind assistance, or old age, must agree with Hippocrates that it is necessary to have "a knowledge of the whole of things." Those of us who know Miss Bailey in action, or only through what she says in the *Survey*, are equally impressed with the way in which she does a most difficult task.

Department of Education

In any program which concerns children, the department of education must play an important part, and like the other departments mentioned, it should provide service, consultation, and instruction. The school is a source of case-finding second to none, and an annual medical inspection with an eye examination by an ophthalmologist will uncover difficulties usually at the time when most can be done to remedy them. The school nurse is the means of interpreting recommendations to the parents and following to see that necessary treatment is given. Sight-saving classes are accepted as the best method of educating visually handicapped children, and in localities not large enough to have separate classes, certain equipment can be provided and helpful advice given by a special consultant in the state department of education. The provision of clear-type books, for instance, is as much a form of eye treatment as medication or surgery. Vocational guidance and trade training are within the function of the department of education and, in the latter case,

it is worth while to mention the importance of teaching by the use of good tools and up-to-date machinery and with insistence on safety devices. A department of education not only supervises the teaching of children, but it provides normal schools for future teachers. Here is a splendid chance to add instruction in eye hygiene and a knowledge of common eye defects and their significance, to the customary teacher preparation.

Other Agencies

Other public departments have a stake in the prevention of blindness; specifically, the department of labor and the department of agriculture. Farmers, like domestic workers, are usually outside the provisions of Compensation Laws, and there are both industrial and agricultural operations which are perilous to eyesight. In the field of voluntary organizations, the agencies are many and varied. They may be primarily educational, research or program planning, like the national and state societies for the prevention of blindness, the Federations of Women's Clubs or Parent-Teacher Associations, or professional organizations like the State or County Medical Societies, Public Health Nurse and Social Work Associations, or they may give direct service like hospitals and clinics or Children's Aid Societies. In each instance, they must all be considered as constituent parts of a complete program for saving sight which is to be formed through integration.

Basic Pattern for Integration

It would greatly simplify my task if I could present to you a neat blue-print of how these different agencies, both public and voluntary, might work together so closely that all children would be surrounded by every factor that safeguards sight. On the other hand, the fact that no completely comprehensive plan has been worked out is one of the reasons that I have the temerity to discuss the subject with you. If a model plan were presented, there would be many cries of, "This will not work. My state or my county is different," and that is not only true but is perhaps one of the reasons why we are still a democracy. However, I should like to borrow a phrase from the fashion magazines which have recently popularized what they call a "basic" dress, a severely plain affair

to which each wearer may add accessories to suit her own style and taste. There is, it seems to me, a basic pattern for integration both on the horizontal and the vertical plane to which may be added certain procedures necessitated by the peculiar organizational structure of each state or smaller locality.

In discussing the ingredients of integration, I mention those in the public field on the state or local level because they are the ones in which we are most involved, but in working out methods of integration, we must certainly begin with the federal program because there the organization is not only definite, but it is now in operation. Immediately after the passage of the Social Security Act in August, 1935, the Interdepartmental Committee to Co-ordinate Health and Welfare Activities was created by executive order, with the duties of studying health and welfare activities of Federal agencies, of making recommendations, and of co-ordinating the programs of Federal agencies in these fields. The duties of the Interdepartmental Committee were amplified in a later order from the President as follows:*

> "It shall be the duty of the Committee (1) to continue to sponsor appropriate co-operative working agreements among the various agencies of the Government in the health and welfare field, and to continue the work under agreements already in effect; and (2) to study and make recommendations concerning specific aspects of the health and welfare activities of the Government, working toward a more nearly complete co-ordination of the activities of the Government in these fields."

This, then, is integration at the very top and operating upon a horizontal plane. The system of consultant services, carried on by specialists attached to the federal departments who are available for help and advice in respect to state plans, is vertical integration and is equally necessary to achieve an adequate program. The prime necessity for efficient co-operation is that each department or agency should be perfectly clear as to its own function and should proceed from that point to a thorough understanding of the functions of the other departments with which it is to collaborate. Integration of services for the purpose of saving sight does not mean

* Executive Order of October 27, 1936.

taking away activities from any agency and setting up one whose exclusive duty is that of prevention of blindness. It means the lively perception of where, within the scope of each agency, children may be considered as whole beings, with the scrutiny of their eyesight as part of that whole. It means the establishment of working agreements and procedures which grow out of a realistic knowledge of what facilities exist and what resources can and should be developed.

States may well borrow from the organization of the federal departments and form interdepartmental councils with representatives from all the public departments which concern themselves with children—health, welfare, and education, with perhaps labor and agriculture, and associate membership from such voluntary organizations as have been mentioned earlier. One word of warning is needed, however, because this is one of those organization plans which frequently looks far more effective on paper than it is in actuality, and certainly, if used alone, would not accomplish the desired goal of integration. For one thing, this type of council is likely to be composed of administrative heads who are removed from the problems of the person who is functioning in the field. It should be complemented by another committee which also cuts across department boundaries and which has on it, for instance, representatives from the supervising staff of the public health nurses in the department of health, of the case workers in the welfare department, and the visiting teachers or school nurses from the department of education, as well as members from the organized voluntary health and welfare services. Here is one of the places where the medical social worker especially trained in eye work can make a special contribution. We should work toward having such a special consultant in each department, but she is perhaps, at present, more frequently found in the division for the blind or connected with the health department or on the staff of a state or voluntary hospital. Whatever her position, she is quick to see the strategic points where service or education may be improved or strengthened, and she can bring real content to the working agreements of the co-operating departments. The ideal organization would include not only a medical social consultant with special knowledge of eye patients but a nursing supervisor within the bu-

reau of public health nursing who advises the nursing staff. These two would serve in a similar capacity to the special supervisor functioning in the department of education.

With these two interdepartmental committees working simultaneously and interchanging the results of their work, and with the local workers who meet on the day-to-day job, testing and improving co-operative procedures, an excellent foundation for horizontal integration will be laid.

External factors, which in themselves seem relatively unimportant, frequently complicate the best of plans. Geographical separation of the various offices of state departments is often a very real obstacle. The capital in which one might expect all the offices to be located is, in many states, not the city most accessible nor most highly organized in resources. This means that interdepartmental planning must be carried on by correspondence or by infrequent conferences involving considerable travel time and expense. For instance, in one state the offices of the Department of Education, the Department of Welfare, and Division of Child Welfare and for the Blind are nearly 100 miles from the joint office of the state consulting ophthalmologist, the medical social consultant, and from the hospital where much treatment is carried out, and the State School for the Blind. Two hundred miles farther off is the State Crippled Children's Commission, which is responsible for the treatment of congenital cataracts. With all the best intentions in the world, and with a plan which is carefully worked out and looks very well on paper, the odds here are against developing truly integrated procedures.

The same difficulty often exists within a department when those in the field are at some distance from the administrative offices. In this respect, I might suggest that distance is often psychological as well as geographical. It is here that the value of the medical social worker and the public health nurse who have both had special training in eye work is most clearly seen. Obviously, they can not give case work service or public health instruction to all the children under care, but they can consult with the local case worker or nurse and make sure that conditions are understood and recommendations interpreted so that nothing is overlooked that might help to save sight.

Situations that call for just this service are vividly stated by one medical social worker in discussing her function as an interpreter. "How can the social worker in a distant county or parish dispel fears, clear up certain doubts, explain why an operation is advisable or even imperative, if her knowledge is limited? We do not want to coerce our clients nor do we have the right to do so; yet do we want them to choose to neglect their eyes and refuse a chance of restoring or improving vision? The case worker should be the one to help the client at such times. She knows him more intimately, is familiar with his environment, and she should understand his hesitancy in accepting recommendations."*

A program for the control of trachoma soon to be established in one of the states illustrates several valuable points in both vertical and horizontal integration. The unit is operated by the department of health and its members are an ophthalmologist, a public health nurse, a medical social worker, a clerk and a truck driver, the last because it is a mobile clinic which moves by trailer. The service provided is significant not only because it combats blindness by the treatment of trachoma but because it offers education to those who are working with children, in whatever field. The ophthalmologist makes an examination to determine what is the matter with the children brought to him with eye symptoms and recommends what treatment should be sought if a condition other than trachoma is found. Such consultant service benefits not only the patient but the practicing physician who is, unfortunately, not always aware of the significance of eye troubles. Contacts are made by the public health nurse with the local health units and collateral treatments such as antiluetic care or special attention to nutritional problems are arranged. The medical social worker plans adjustments with the school, made necessary by the eye disease found, or works with public or voluntary social agencies on problems which arise. Each of these members of the unit is in a strategic position to further the understanding of others who have an interest in seeing that the sight of children is safeguarded. Because this particular unit is supported partially through federal funds, advice is available from the public health nurse and medical social work regional con-

* Harrison, Anna M., "Possibilities of Restoration of Sight and Prevention of Blindness in the Aid to the Blind Program," *Sight-Saving Review*, September, 1940, p. 184.

sultants of the Children's Bureau, so the line of integration here goes straight from the top to the bottom.

Programs in an agency are first laid out in broad general lines but their application in social case work is to individuals. The case worker is concerned with saving sight in children, not because it is an economically sound thing to do but because it will help to assure each child under her care the chance to live a fuller and more satisfying life. She knows that any handicap which hinders this development has potentialities for harm to the individual and to society. Her concern must be founded on an understanding of what visual defect may mean to a child and why its consequences are not alone impaired efficiency but inner conflicts which may be manifest by preoccupation with self; by inability to face and accept responsibility; or by irritability or timidity. Her aim must be to help the child meet his particular problem by using the services available for him in the way that will best meet his need. For instance, it is not enough to "arrange" admission to a sight-saving class, it is necessary to know whether he and his family are able at the time to profit by such service. For example:

> A mother brought her nine year old boy to a pediatric clinic, complaining that he was sickly and irritable and insisting that she was greatly worried over him. He was found to be undernourished and timid and it was most difficult to make friends with him. He was referred to the medical social worker for a social study. She learned that the mother had been greatly disappointed that her child had not been a girl and had kept him in curls until he went to school and had prolonged his baby interest in dolls. Her over-protection was so intense that he had never been allowed to play with other boys and had been taunted by them as a "sissy." He was sensitive about his "difference" and resorted to irritable and demanding behavior at home. Besides his poor general physical condition, he was found to have decidedly defective vision and admission to a sight-saving class was recommended by the ophthalmologist. The medical social worker's understanding of the whole situation made her believe that this was not the time to add to the boy's feeling of difference by sending him to a special class. She realized the overwhelming desire of all children to belong and to conform, whether it is by playing the same games or by wearing the same kind of clothes. The ophthalmologist was

much interested in this analysis of the family situation, and suggested that temporary arrangements be made with the teacher for the remainder of the school year—about two months—so that the boy need not be called upon to do work that demanded close use of his eyes. His mother was brought to realize something of her part in her son's development and agreed to let him spend the summer at a boy's camp. There he began to learn to play with others and to accept the give-and-take of healthy competition. When he returned to school in the fall, he was able to take the referral to the sight-saving class in his stride. His sight will be saved but not at the expense of his personality adjustment. Services were integrated with full comprehension of emotional as well as physical needs.

I hope that all of you had in your childhood, as I had, a kaleidoscope. Those pieces of gaily colored glass fascinated me as, with a slight turn of the wrist, I caused them to fall into a dazzling but orderly pattern. At each turn, the same pieces of glass were used but the pattern was markedly different, although the resulting picture was always just as enchanting. Is not this toy analogous to the topic of integration we have been discussing? The constituent parts of a program for saving sight are all there and should all be brought into play, but the pattern of care provided for each child in conserving his sight will be different because those services are used which best meet his individual need. Integration is used to the end that he may have the fullest complement of sight possible as part of his equipment for life.

Children's Eyes

Willis S. Knighton, M.D.

DISCUSSES the development of the eye, the refractive errors, binocular vision, and eye diseases and injuries in childhood.

CHILDREN'S eyes are not adult eyes. Although the eye, like the brain, is precocious in its development, it does not reach its full size until about the age of 10. Thereafter it undergoes natural changes, such as toughening of the sclera (outer coat, commonly called the white of the eye), with loss of elasticity, and packing down of the innermost lens fibers. (The lens continues to grow throughout life.) Even after the eye has reached its full growth, there are structural changes in the orbit which modify the action of the muscles that move the eye, so, for practical purposes, it would seem fair to say that the eye does not settle down to adult life until the rest of the body has matured, at 16–21 years of age.

Development of the Eye

Functional development of the eyes is partly a matter of education. Heredity, of course, plays an important part because it determines the capacity to improve.

Lid reflexes to light are present during the first ten minutes of life, but fixation movements (trying to follow a light) are not definitely established for ten days. The macula (area of sharpest vision which enables one to perceive detail) itself is not fully developed for six months.

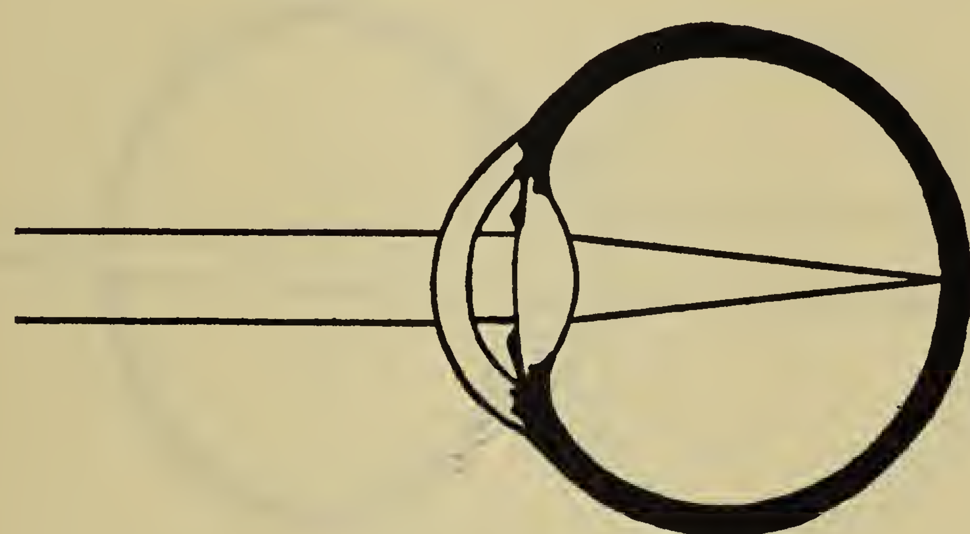
The question of vision in early childhood is not easy to evaluate, because it must consider such psychological factors as attention and interpretation, as well as the physical ability to hold the eyes fixed upon the reading chart and to see clearly. It is doubted whether the child is physically able to read 20/20 until the age of 5.

Thereafter his visual education progresses rapidly. Once he has

started his three R's, he is confronted with the necessity for good visual acuity, proper co-ordination of the two eyes and stereoscopic vision (binocular perception of depth).

A routine school test should be regarded as only a preliminary report of visual acuity and in no way as an examination of the eyes. The ability to read 20/20 is no criterion of the function of the eyes, as we shall see, and unless the test is understood, erroneous conclusions may be drawn.

The term "20/20" is an arbitrary standard of normal vision. The size of the letters or test symbols is designed so that an eye with normal vision can interpret them at 20 feet. Since the test is supposed to be conducted at 20 feet, the other lines are designated as 20/30, 20/50, 20/100, etc. If the patient at 20 feet can read only



Normal Eye

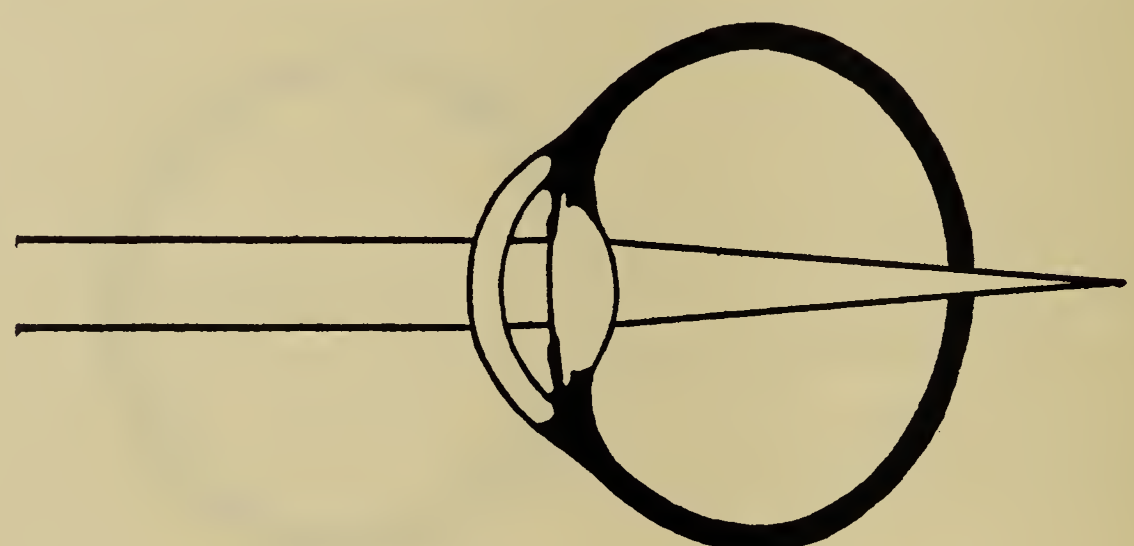
the 20/40 line, for example, his visual acuity is reduced, because he should be able to read that line at 40 feet! Similarly the 20/100 line should be legible at 100 feet, etc. Don't make the mistake of saying that 20/40 vision is 50 per cent normal—20/40 is not a real fraction and is written that way only for convenience. As a matter of fact, 20/40 is nearer 80 per cent normal.

Normal visual acuity and normal refraction must be differentiated. Normal visual acuity simply denotes the ability to read the 20/20 line, regardless of refractive error, eyestrain, etc. Normal refraction, called emmetropia, means that the optical system of the eye is correct so that distant images are focused on the retina without any strain. The visual acuity may be reduced by retinal disease, even when the refraction is emmetropic.

Distant vision—20 feet—is the standard for refractive tests. Closer work requires focusing by the action of the ciliary muscle on the lens inside the eye—called the act of accommodation. The emmetropic eye can see distant objects clearly—20 feet or more—without any strain or accommodation. Closer work requires a normal amount of accommodation.

Refractive Errors in Childhood

In *hyperopia*, or "far-sightedness," the eye must accommodate even for distant vision. The emmetropic eye can see just as far and just as clearly as the hyperopic eye, but while the emmetropic eye is relaxed, the hyperopic eye has to accommodate or strain. The



Hyperopic Eye

more hyperopic it is, the more it has to strain, so the term "far-sightedness" seems inappropriate. Close work entails additional accommodation, with the result that the hyperope must always use his accommodation more than the emmetrope. This extra use of the accommodation, which is directly proportional to the amount of hyperopia, causes all of the symptoms, from eye-fatigue through strain, congestion, blurring and headache to interference with the co-ordination of the two eyes and general systemic disturbances.

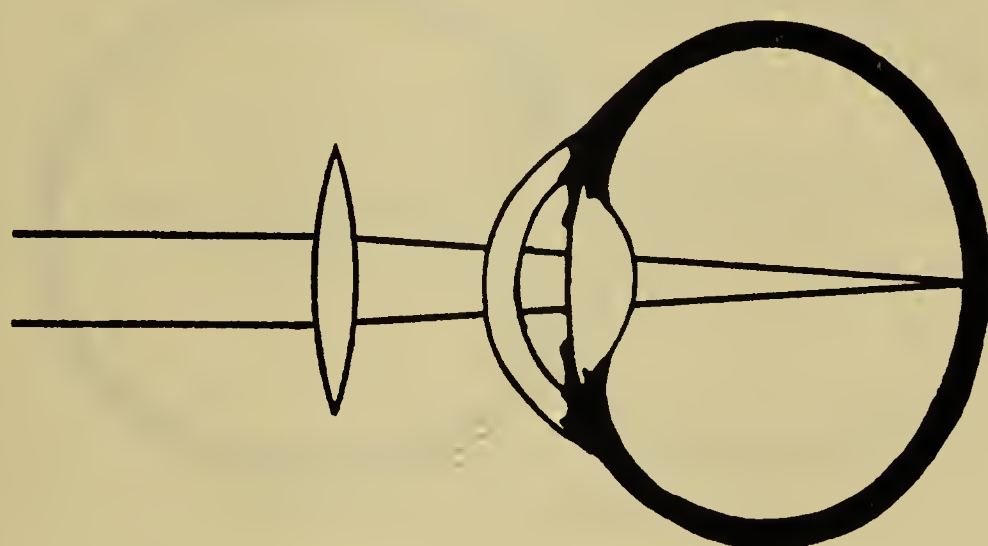
Small amounts of hyperopia are easily taken care of by the average child, because he has a great deal of accommodative reserve; it is only in the higher amounts, when the accommodation is being taxed, that the symptoms appear. The amount of strain can be determined accurately only by an examination which re-

laxes the accommodation with medicine and thereby discovers the total hyperopia.

When the amount is appreciable, the hyperope will tend to avoid close work as much as possible. Thus the boy in school will prefer looking out of the window to studying. On the other hand, he will probably be good at outdoor games.

All the symptoms of hyperopia are corrected by glasses which do some of the focusing and relieve accommodation. The glasses will have to be worn for close work or all of the time, depending upon the findings in each case.

In *myopia*, or "nearsightedness," the child cannot see clearly in the distance, but he can and does enjoy close work. As a result, he becomes a bookworm, with excellent marks in school, but his lack



Hyperopic Eye Corrected by Lens

of interest in out-of-door activities doesn't make him popular with his schoolmates.

Distant objects focus in front of the retina because the eyeball is usually longer than normal; in order to get the focus back to the retina, the object must be closer than 20 feet. The greater the amount of myopia, the closer the object must be held to see it clearly.

Small amounts of myopia are considered physiological. They do not progress to any appreciable extent and they are not accompanied by pathological changes within the eye. Distant vision is slightly blurred, but the child may not notice that because he can make things clearer by squeezing his lids together. Glasses will correct him perfectly.

Malignant or "progressive" myopia, which fortunately is quite rare, gets worse, as the name implies, and no means of arresting it is known, unless a concurrent infection is discovered and remedied. Present opinion leans toward the theory that malignant myopia is the result of a low grade inflammation like uveitis. It is accompanied by stretching and tearing inside the eyeball, and in the last stages there is degeneration of the eyeball, with detachment of the retina and dislocation of the lens. During the early stages the vision gets progressively worse, even with glasses.

The exact cause is not known, but a lack of resistance in the eyeball itself is fundamental. Little hope can be held out for a case of this kind, but when it is recognized early, the patient and

MYOPIC EYE

his family can be prepared so that his future course can be planned accordingly.

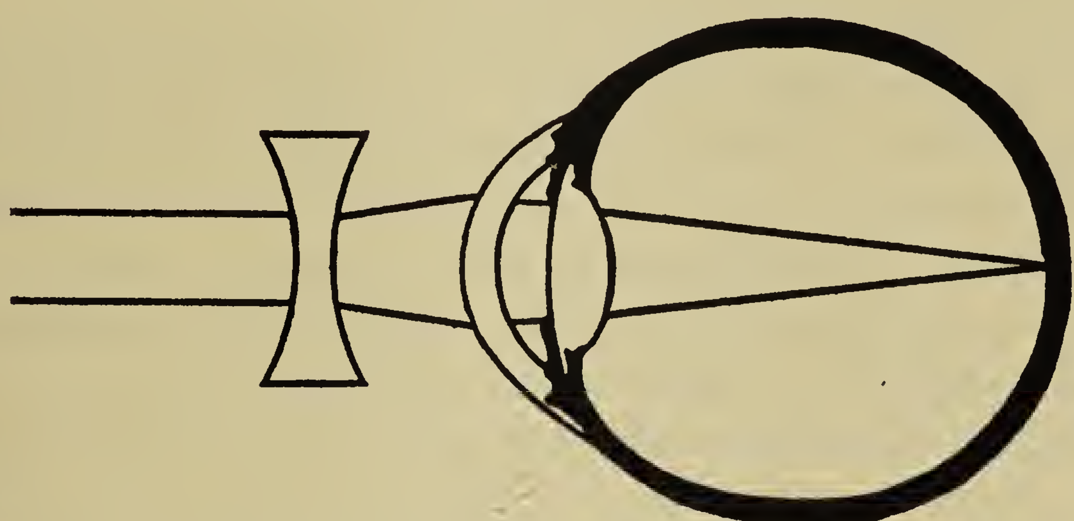
In between these two extremes lies the average type of myopia, which continues to progress up to a certain point and then slows down or stops altogether. Its most rapid progress is usually between the ages of 8 and 16 years, and in that period the proper care of the eyes can modify the final outcome to a great extent.

The myope can see close work clearly without accommodating, so his eyes do not get the proper amount of accommodation activity that nature intended. He should wear his correcting glasses *constantly* if his eyes are to act normally and to see clearly. Close work should be limited to sensible proportions, and always under optimum conditions of illumination. The reading type should always be clear so that there will be no temptation to hold

the work too close. Since the myopic eye is physically weak, it should be aided by especial attention to the general rules of health.

In every case of myopia the refraction should be done under a cycloplegic, to insure complete relaxation of accommodation during the test and to find the total error. Periodic examinations are necessary to determine the progress of the disease.

The normal eye at birth is short and the lens is round. This gives a preponderance of hyperopia in infants, but as growth proceeds, the eyeball lengthens and the lens flattens out and the hyperopia decreases. If the initial hyperopia is low, it often ends up as a low degree of myopia. For this reason, a fair amount of "hyperopic reserve" in infants is desirable.



MYOPIC EYE CORRECTED BY LENS

In *astigmatism*, because the eyeballs are not quite symmetrical, everything appears somewhat distorted. The child may not be conscious of this when the amount of astigmatism is small, and he may even be able to make out the 20/20 line, but his accommodation is automatically trying to clear up the image. This it cannot do—for anatomical and physiological reasons—but it continues to try, nevertheless. In addition to the eyestrain thus imposed, there is a general nervous strain, varying in its manifestations from "nervousness" to actual nausea, vomiting and convulsions, according to the amount of astigmatism.

Myopia or hyperopia may exist in conjunction with astigmatism and add its own symptoms. Nothing but glasses can correct astigmatism, but when these are worn, the symptoms disappear like magic. Careful refraction will determine whether glasses are necessary.

In general it may be said that symptoms from any of the refractive errors can be relieved only by the wearing of glasses. Some relief is often obtained just by the correction of bad reading habits, but the attempt to do away with glasses by giving exercises which stimulate a tired muscle can accomplish no permanent good.

Binocular Vision

The highest function of the two eyes is stereoscopic vision, the ability to appreciate depth or three dimensions. It is a mental concept entirely and depends upon (1) good visual acuity in each eye, (2) perfect co-ordination so that the two eyes see the object simultaneously at any distance, and (3) cerebral fusion into one image. Only then can true stereopsis take place.

The modern treatment of cross-eye, or strabismus, is not satisfied until an attempt has been made to develop the full faculty of stereoscopic vision. Merely straightening the eyes may leave one eye "uneducated" so that it does not function with its fellow.

The problem of strabismus is quite complex. Suffice it to say that no two cases are exactly alike and similar management often gives widely different results. Because refractive errors may cause, or at least modify, the strabismus, each case should be carefully refracted under a cycloplegic (a drug used to put the accommodation temporarily at rest). In conjunction with exercises to re-educate the individual to use his two eyes together (binocular vision), proper glasses are often sufficient to straighten the eyes. At other times they have no effect and operation is necessary. (The choice of operation itself is often difficult.) Sometimes all three procedures are necessary, and none of them should be condemned because of known failures.

Since binocular vision is a late acquisition it is easily lost if defects in its functioning are neglected too long. Every case of manifest strabismus, whether convergent or divergent, should be cared for *as soon as possible*, otherwise the child will learn to suppress the image in the deviating eye, to avoid diplopia (double vision). Later treatment may be unable to restore the vision that has been suppressed, and it remains poor from disuse—amblyopia exanopsia.

There is a large class of patients with heterophoria, i.e., a tend-

ency for the eyes to deviate from normal co-ordination. In these cases there are symptoms of eye fatigue while the brain tries to maintain fusion against the imbalance of the muscles. Occasionally, when the patient is tired, the fusion sense cannot overcome the imbalance, and one eye breaks away, giving double vision and the appearance of a "cast." The condition is then a manifest strabismus, spoken of as a "tropia." Fusion demands may again overcome the heterophoria, always with a feeling of fatigue, or the deviation may remain permanent.

Esophoria is a *tendency* to converge, *esotropia* is a *manifest* convergence. Exophoria and exotropia refer to divergence, hyperphoria and hypertropia refer to upward rotation.

The "tropias" are easy to detect in children, but the "phorias" can be discovered only by testing of the muscle balance. Refraction and exercises under proper direction often suffice to relieve heterophoria, although operation may be advisable in high degrees of imbalance, especially in adults.

Eye Diseases in Childhood

The problem of eye diseases in children resolves itself into two main considerations: the conservation of vision and the prevention of disease.

The conservation of vision is mentioned first only because it must take into account those hereditary and congenital cases that enter into this vale of tears with defective eyes or vision or both. Preventive medicine will always play a small rôle in combatting inherited defects, until nature's laws are better understood and eugenic standards are raised. The main problem is to educate the patient in the use of what little vision was given him, so that he will be able to enjoy some of the luxuries of seeing, and to teach him how to avoid overtaxing his limited visual strength. In the majority of cases, little more can be done and it is cruel to raise false hopes. That, however, does not relieve us of the responsibility of always trying to lift the veil. If every case of interstitial keratitis, for example, were left untreated, many more children would be blind today. The disease is due to congenital syphilis and results in a clouding of the cornea with reduced vision, and distressing pain in any kind of light. Antisyphilitic treatment is not successful in

every case in clearing the cornea and relieving the photophobia, but the reward is obtained in the many cases that do respond and get relief. Congenital glaucoma, buphthalmos, is another instance that warrants interference. Here the filtration of the intraocular fluids is defective. Unless artificial filtration is provided by operation, the intraocular tension distends the eyeball (it is very elastic in children) and ultimately destroys the vision by pressure on the retinal nerves.

Retinitis pigmentosa is an early disease for which there is no known remedy, although many attempts have been made to relieve its effect on vision by medicine and surgery. It follows a definite hereditary pattern and results in poor vision, especially in dim light (night-blindness), getting progressively worse and often accompanied by cataract.

These and many other diseases, unfortunately, fall into the category where treatment seems to play a minor rôle and where sight conservation seems to offer the best help.

Acquired eye diseases can be prevented. All that is necessary is a knowledge of the cause and a sure cure for it. That's a pretty big order, but every year sees new methods of diagnosis and treatment that are working wonders.

Most external diseases of the eyes, lids, etc., come from the outside and can be laid to unhygienic conditions. Even in the most scrupulously clean homes, the child who spends most of his time on the floor rubs his eyes with dirty fingers.

Conjunctivitis is an inflammation of the membrane which forms the inside lining of the lids and also covers the front of the eyeball. When the eye becomes inflamed from any external irritant, like dirt, dust, wind, rubbing, etc., the layman calls it "pink-eye." (That is a dangerous term because the eye appears "pink" in many other diseases, including some that originate on the inside.) Conjunctivitis assumes different forms, flat and follicular, and may be accompanied by pus. Large follicles under the upper and lower lids are common in children and may require scraping before they disappear. The disease itself is not dangerous, but it is very annoying. It is infectious but not contagious, i.e., it can be transmitted by contact, on towels, handkerchiefs, etc., but not by mere association. Treatment is relatively simple and effective. By contrast,

trachoma, which resembles follicular conjunctivitis, is intractable—it scars the lids and impairs the vision by clouding the cornea. The danger of considering every inflamed eye as a "pink-eye" or a "cold in the eye" is obvious.

Other external diseases, like styes and inflamed lids, may respond readily to home treatment, because nature is kind, but it is wise to let the eye physician suggest the treatment that will help most.

Inflammation and disease of the cornea (keratitis) reduce the transparency of that tissue and impair vision. In general it may be said that keratitis which results from outside infection is easier to handle than when it occurs as the result of general disease, like tuberculosis, or follows another internal infection, like sinusitis.

Children are prone to a form of keratitis, sometimes associated with conjunctivitis, called phlyctenular keratitis. Tiny painful elevated spots appear on the cornea and conjunctiva and the eye appears "pink" because of the inflammation around the phlyctenules. Tuberculosis is thought to be a factor in the production of this disease and unhygienic living conditions seem to play a part.

Iritis is an inflammation of the iris, the colored part behind the cornea and in front of the lens. The causes of iritis are legion, from a nearby infection, like abscessed teeth, to a remote infection in almost any part of the body. The iritis itself is not noticeable until some special magnifying instrument is used, but it is usually accompanied by an inflammation that encircles the cornea on the *outside* of the eye—again a "pink" eye. The outside inflammation is not as marked as in many cases of conjunctivitis and for that reason may not seem important to the layman. It does suggest internal disease to the eye physician, but even to him it conveys no hint of the full extent of the damage. Iritis, cyclitis, and choroiditis often exist together or run from one into the other because the iris, ciliary body and choroid form a continuous lining called the uvea. Uveitis means an inflammation of all three.

The choroid is a vascular layer that lies under the retina and supplies some of its nourishment. Because of its close connection, any disease of the choroid can cause an inflammation of the retina, and when the retina is affected there is a proportionate loss of vision. Extensive disease can exist inside the eye without any external manifestation, and in the case of infants who cannot an-

nounce their poor vision, it may remain undiscovered for a long time. Even in older children, who are more articulate, the internal disease may be passed over in its early stages before it affects the vision *noticeably*. The obvious precaution is a routine eye examination, including inspection inside the eye.

All of these structures, from the lids to the retina, may become involved in those acute infectious and contagious diseases called "common childhood diseases." Toxins, viruses, and bacteria play a part directly and indirectly, and unless the pediatrician pays attention to the eyes of his patients, inflammation, paralysis, and death of eye tissue may occur.

Conjunctivitis is a common accompaniment and ranges in severity from a mild inflammation to a severe infection with pus and involvement of the cornea. The muscles that move the eyes are weakened or paralyzed in diseases like encephalitis, scarlet fever, and diphtheria. The upper respiratory infections may be accompanied by iritis and sudden blindness of one eye, and tularemia may cause optic atrophy.

Pediatricians are more "eye-conscious" today. Their small patients have a better chance of surviving the childhood diseases with healthy eyes because the doctor knows more about the prevention and treatment of the specific dangers to the eyes and doesn't rely on long periods of inactivity in a darkened room.

Eye Injuries in Childhood

Any discussion of children's eyes would be remiss if it did not mention injuries, and yet it is difficult to know how much or how little to say. The average parent knows enough to see that children are kept away from sharp and cutting toys and from all situations that might prove dangerous. But when eye accidents do occur, his reaction is unpredictable. The safest treatment is to see an eye physician immediately. A blow on the eyeball may be painful without causing damage, or it may be severe enough to rupture something inside the eye without giving any outside evidence. The external appearance is no criterion of the damage done. Neither, unfortunately, is the amount of pain.

When something sharp has entered the eye, there is always the added danger of infection. Perhaps a word here about boric acid

will not be amiss. From time immemorial this solution has been considered a panacea for all eye diseases, and when the parent uses it in inflamed or sore eyes, he often feels that everything possible has been done. The unfortunate result is that much valuable time may be wasted in using this ineffectual "eye-wash" when something more specific should be done. Argyrol as a home remedy may be similarly condemned.

In addition to the danger of infection from penetrating wounds, there is always the possibility of sympathetic ophthalmia. This is a dread disease which destroys the *other* eye, unless prompt measures are taken. The disease is so treacherous that it may not make its appearance until the injured eye has apparently healed, and it has been known to wait as long as 40 years before attacking the other eye!

Home remedies have no place in the treatment of eyes. Competent care and treatment can preserve good vision.

Industry's Responsibility in the Conservation of Sight*

Charles F. Kutscher, M.D.

AS a consulting ophthalmologist for a large steel corporation, the author presents his experiences in trying to solve the problems of eye accidents in industry.

THE old proverb, "An ounce of prevention is worth a pound of cure," carries real significance in eye injuries. In view of this, our efforts should constantly be spent in devising new preventive methods, as well as continued education in the proper use of the available safety devices.

The eye is one of the few organs of the body that nature has so richly endowed with protective devices. The ball itself rests within a pyramid of bone, the apex directed posteriorly, the base forward. The ball is cushioned from this bony framework by soft tissue composed chiefly of muscle and fat. The force of a blunt object striking the eyeball is rendered less damaging by being transmitted in part to these soft tissues. A sort of shock absorber for the eyeball is set up by this anatomical arrangement. The lids form the protection for the front of the ball and they are so constructed that in case of danger they can be promptly and effectively closed—all automatic, so to speak. Foreign bodies, ever so lightly touching the eyelashes, produce an immediate closure of the lids. Many cases of third degree burns of both upper and lower lid without the slightest damage to the ball offer mute testimony as to the effectiveness of the reflex closure of the lids. If an imaginary straight line is drawn from the center of the eyebrow to the upper part of the cheek, the front of the eyeball will be found to lie just behind this line. Because of this, very large objects striking the face miss the

* Presented at the National Conference of Social Work, June 5, 1941.

eyeball. The eyeball itself has a very dense, tough covering, which is not too easily penetrated. We see many scleras partially penetrated by foreign bodies which would have completely penetrated a less dense membrane.

The first fundamental in the visual act is that light can be freely transmitted to the retina. In order to fulfill this physical fact, nature is unable to install, within the eyeball, measures she usually uses for defense. There is no blood vessel network occupying the hollow of the eyeball. Obviously blood vessels, with their rich supply of immune bodies and the reconstruction building blocks, could immeasurably aid the injured eye, and by being immediately available, lessen the length of convalescence. If, however, these vessels were present, they would impinge the incident light prohibiting its access to the retina. Many accidents which would be mere trifles to other organs are major catastrophes to the eye.

A close scrutiny of the defenses which a beneficent nature has bestowed upon the eye indicates a supreme desire on her part that no injury be inflicted upon this organ.

With the increasing complexity of the industrial machine there is an ever-expanding risk of eye injury. By far the greater number of eye injuries are caused by foreign bodies on the surface of the eyeball or imbedded in the cornea. The major portion of the remaining accidents fall under one or more of the following causes: (1) burns of eyes, chemical or thermal; (2) contusions of ball; (3) rupture of eyeball; (4) intra-ocular foreign bodies; and (5) radiant energy. A word of warning bears stating at this time: *i.e.*, after many types of eye injury there is a latent period from the time of accident until the development of symptoms, such as pain, headaches, or visual disturbance. This latent period may occupy a few hours or a day or so. The withholding of treatment until the development of symptoms may mean the loss of an eye that could have been saved had treatment been instituted early. Wounds of the eyeball open the portals for the entrance of disease-producing germs frequently present on the surface of the ball. Badly managed or delayed treatment gives these organisms a chance to gain a foothold which may be the decisive factor in the battle to save the eye. Without boring you with the medical reasons why, suffice it to say that the convalescence from many eye injuries occupies

months, many of them being borne with pain. Only those who have suffered pain in the eye can appreciate its intensity and its seemingly age-long character. The pain of a sore hand can often be alleviated by holding it or by putting slight pressure on it. These pain-relieving devices cannot be of aid to a suffering eye.

Since many injured eyes are doomed from the moment of inception, it behooves all of us—in industry as well as out—to use a little caution in the discharge of our daily duties and pleasures. We see in our private practice many eyes injured beyond all hope of repair often resulting from some thoughtless action. An example—the careless handling of household ammonia, lye, and caustic soda may result in a painful eye injury which may terminate in blindness.

Industry has many reasons for protecting her employees against injury. The reasons are human as well as selfish. The blind receive almost universal sympathy, and it is not conceivable that any one would be negligent in supplying the means to protect an eye against injury. There are many important key jobs in industry that have cost the employer large sums of money in preparing a particular man for a particular job. Eye injury may temporarily or permanently prevent the man from fulfilling his job, causing an interruption in the normal flow of work. In these competitive times any lags in the production schedules are costly. Following a serious eye or general accident, a marked decrease in the efficiency of fellow workers may be noted. This may slow up production for a day or so. Prevention of the cause of this perfectly normal reaction materially cuts down operating costs—a situation all employers are interested in. The compensation laws are such that eye injuries are, and rightly so, expensive injuries.

The course pursued by industry in the prevention of eye accidents follows a very simple but intelligent course, and includes the following steps:

1. Removal of all possible hazards
2. The wearing of appropriate goggles
3. The constant education of the employee concerning the likelihood of eye injury
4. Constant supervision to make sure that the employee is following his safety regulations
5. Promptness in the reporting of eye accidents

By following this simple routine countless thousands of eyes have been saved and by prompt institution of treatment the duration of illness has been greatly decreased.

The removal of all possible hazards forms the first link in the chain of defense. To accomplish the desired result it is necessary that employees maintain their machines and equipment in proper working order. Many an eye has been injured by being struck by a missile from the machine itself. Fractured members of a machine are often sent through the air at enormous speed. The abundant use of safety guards around moving parts has been quite helpful in prevention of injuries. The following case history will help to illustrate the danger of broken machinery being kept in use:

> A man operating a large valve broke the metal ring joining the spokes of the handle of the valve. He continued operating the valve, using the spokes to open and close the valve. One day he slipped and the sharp end of the spoke gouged out his eye. If the rim of the valve had been intact, the accident could not have happened.

Cases have been treated where employees have tripped over equipment that had carelessly been left in aisle ways. In falling, the eye has struck some projection, producing a rupture of the eyeball. The proper illumination of industrial buildings has removed a frequent cause of accident—dark hallways and stairways where employees are unable to see sufficiently well to "watch their step."

Perhaps no single procedure has done as much to prevent industrial accidents as has the wearing of safety goggles. Untold thousands of eyes have been spared by their use. The savings to the employer run into millions of dollars since the advent of their use. At present they can be supplied to prevent almost any type of injury. To prevent the damage done by flying particles heavy lenses of large diameter are available. These lenses, by a method of heat treatment, are capable of standing up against enormous impacts without breaking. While it may be true that an occasional eye is lost by being badly cut by flying fragments of glass if the lens is broken, yet the number of eyes saved is so large as to make the number lost seem insignificant by comparison.

Moreover, particles striking the goggle with sufficient force to break the lens would most assuredly destroy the eye.

To individuals exposed to infrared or ultraviolet light, lenses containing appropriate pigment give 100 per cent protection against these harmful radiations. It must be remembered that when the source of these rays is intensified, a darker shade of lens must be used. In certain industries, caustic chemicals existing as finely divided powder suspended in the air is a serious threat to the well-being of the eye. To avoid this hazard dust-proof goggles are being supplied which are effective barriers against the dust causing damage to the eyes.

"Familiarity breeds contempt" applies to all of us at times. Men constantly engaged in dangerous pursuits often grow careless of the possibility of accident. They feel that it won't happen to them. The safety engineer has constantly to preach to these individuals to keep them accident-conscious at all times. Much instruction is given by the safety department on how to avoid accidents. They have been as helpful to high production levels as any group of officers in a plant. By their relentless effort the lost time accident rate has been materially reduced. Lost time is expensive in that a change of operating personnel results. The loss from this alone may be much greater than the medical costs involved in treating the injured eye.

It may seem strange to some of you that constant supervision by our safety engineers is necessary. One would think that, after instruction concerning a possible hazard, an employee would be faithful in using all possible safeguards to protect his eyes. Unfortunately, that is not so. Frequently during inspection trips you will suddenly come upon an employee wearing his goggles on his forehead. On being questioned, all sorts of alibis will be issued. Even suspending the offender from work for a few days has not stopped the practice. Object lessons such as seeing his buddy lose an eye under similar circumstances may not be sufficient instruction. Men exposed to ultraviolet radiation are faithful in following regulations concerning goggles because they are aware of the severe eye pain that follows exposure to these rays.

Goggles are of necessity uncomfortable, being constructed of heavy, durable materials with very thick lenses. Light weight

construction would fail in performing the very duty for which they were developed. They must be heavy and strong to offer the needed protection. Because of the weight they become uncomfortable after prolonged use. This discomfort can be greatly lessened by having goggles fitted to each employee rather than just hanging them on his face.

In former times, when an employee got a foreign body in his eye, he would seek the professional service of his fellow workmen. Many a dirty hand, holding a pocket penknife, has guided a foreign body out of the eye. Each plant would have one or more employees who acquired considerable reputation among their fellow workmen for their dexterity in treating injured eyes. Obviously such unsterile techniques resulted in infection, causing the loss of many eyes. It took considerable education and regulation by management to put an end to such vicious practices. In industry today a serious offense is committed when an employee fails to immediately report an accident. This rule alone has saved many eyes, as well as other members of the body.

Following injury to the eyes, management generally lends an especially sympathetic ear. If at all possible the employee is put back to work. The character of the work done prior to injury and the visual acuity after healing are the deciding factors in the rehabilitation program set up for the case at hand. The habits and personality of the employee also must be considered in finding a new job in the plant.

Quite naturally an injury extensive enough to render an employee blind also renders him unfit for further employment in the average plant. Many jobs can be obtained for those individuals whose vision is 20/50 in the better seeing eye. Certain machines that are slow operating and can be adequately surrounded by safety devices can be operated by these unfortunates. Many with vision of even 20/70 in each eye operate slow moving lathes. This is a dangerous practice, except in certain very special cases. Janitor or general labor service in those parts of the plant where the rapid movement of equipment or material is not taking place can be effectively carried out by those with poor vision. The operating of open hearth doors can be as adequately carried out by a man with 20/70 vision as by a man whose vision is normal.

While each case is a law unto its own, it is the opinion of the author that, in general, certain points if borne in mind will help in finding the type of work that can be safely carried out.

1. Protect the eyesight that is left by wearing rimmed spectacles or safety goggles if the slightest hazard exists.
2. The quieter environments in the plant give the employee the distinct advantage of using his hearing as an aid in protection against further accident.
3. Avoid those areas of the plants where equipment or material is in rapid motion.
4. Those areas of the plant where pieces of equipment or goods must of necessity be lying about in an apparently disorderly fashion are danger zones.
5. Machine shops where flying chips from lathes, grinders, and planers are flying about should be completely avoided.
6. Locations where explosions might occur, such as pouring platforms and the like, necessitating rapid removal of one's self from the locale, is certainly not the place for one whose vision is materially reduced. Remember, in general, one with reduced vision also has slow vision. He has to study the image longer.

In closing, I should like to repeat what I said at first; in eye injuries, "An ounce of prevention is worth a pound of cure."

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request.

I Live in a Sighted World

In writing this paper my only qualification is that I myself fall under the general category of the visually handicapped, and have had the educational experience provided by the sight-saving program, and I know something of the experience and problems of other partially sighted persons. In other words, I write merely as a representative. Perhaps the first questions any one would be asked are, "What is it like?", "How does the world look to you?" Answers to these questions, perhaps surprisingly, would be basically the same as the answers to any questions involving human experience, and yet they would be as varied as the individuals giving them.

As we have often been told, there is no psychology of the partially seeing—there are only certain deviations or patterns that are characteristic of them as a group. I can probably best illustrate this by drawing from my own experience.

The most obvious thing, of course, is the reduction of vision. To me, the world, which is like a photograph to most people, appears hazy and more like some medieval painting. Strangely enough the person does not always recognize his disability and this leads to many emotional problems. For example, the wearing of glasses may so increase the vividness and clearness of vision that the partially sighted person may very easily think he has quite normal sight. This experience has happened to me and was re-enforced by a natural desire to identify myself with the sighted. As a result, I interpreted my inability to do things calling for normal vision as a mark of inferiority.

The insecurity one feels in facing the unknown darkness around him

increases the natural tendency to depend on others, and this, I believe, is one of the fundamental problems of those with limited sight. Parents or uninformed teachers are very likely to take an emotional attitude and increase the individual's dependence by doing everything for him. The gap between him and his normally sighted companions is also increased by the little habits and mannerisms he is likely to develop.

The problem of social relationships is, of course, not so acute with the partially sighted as it is with those who are hard of hearing. My own experience has probably presented more problems of social adjustment than most others. A simple thing like my failure to recognize people and my refusal to admit the source of this difficulty has given me many periods of lonely isolation, particularly in the high school period. I have found it very important (and know that others share my experience) to learn to get along with the normally sighted people around me. This seems to emphasize the almost imperative necessity for the partially sighted person to live in a natural community environment. In school this means that the sight-saving class pupil needs every opportunity to mingle with children in regular classes.

Basic to all these problems, of course, is the factor of economic disability. We are only beginning to make progress in this line. Probably it is not my place to formulate a plan for a welfare program, but with this reservation in mind, I should like to make a few comments. From the educational standpoint there are certain requirements which I believe are fundamental to a good program. First of all comes an adequate medical set-up. This means regular and frequent ocular examinations and a school program which allows the sight-saving class instructor to follow medical recommendations. Adequate educational facilities and personnel to give the children as normal an educational experience as is possible would be next on my list. This implies not only formal subject matter and skills, it means that the teacher must be capable of dealing with the mental hygiene problems of her pupils. In other words, the sight-saving class program is, first of all, education. The sight-saving class instructor is a good teacher who adapts her program to the special needs of her children, but her goals are the same as those of any program. These are or should be the development of those factors which make for a well-rounded, emotionally stable personality—one who accepts his limitations, but who does not stop short of them. This would perhaps be more ideal than practical, except for the fact that many such school programs are actually getting results.

In Minneapolis at the present time the Sight-Saving Department

is developing a vocational program in the schools which seems to be a promising approach to the problem of economic dependence. The result of this program is a permanent placement percentage that is actually higher than the percentage for normally sighted high school graduates. This program involves a highly individualized review of records and vocational testing. It involves a very careful job analysis in relation to the individual student. During the last year of high school there is a very careful pre-vocational training and part-time placement on apprenticeship basis.

It is interesting to note that in reviewing the early school records of each student, it has been found that success or failure often appears to depend on the teacher's handling of early school situations. This brings us to the possibility of orienting our educational program in relation to its vocational aspects. This does not mean a rigid pre-vocational program. It rather implies the application of progressive methods for the purpose of developing emotionally healthy, socially responsible adults.

I think I should summarize this material by saying that the needs of a partially sighted person center around the need for normal development in a natural environment. Any program which provides an artificial or segregated life would fail to meet this requirement.

—Milo Gilliland
St. Paul, Minnesota

News of State Activities

THIS Section is devoted to the reporting of sight conservation activities carried on by official and voluntary agencies throughout the country. It presents information supplied by these groups, and serves as a medium for exchange of experiences. Only brief and timely items can be used, because of the limitations of space.

District of Columbia

"An urgent need in the District of Columbia will soon be filled, since Congress recently appropriated funds for a full-time ophthalmologist on the staff of the Health Department.

"The new ophthalmologist is to serve part time in the school medical inspection bureau and part time in other bureaus of the Department of Health."

—*District of Columbia Society for the Prevention of Blindness, Washington, D. C.*

Illinois

"The Illinois Society for the Prevention of Blindness had a heavy legislative program at the State Legislature this past winter. The sledding was heavy, but there was a happy ending.

"I. House Bill 70, which was sponsored jointly by the State Firemen's Association, Illinois Congress of Parents and Teachers, and the Illinois Society for the Prevention of Blindness, with the backing of the Chicago Tribune, was signed by the Governor July 1, 1941.

"This Bill does away with the retail sale of explosive fireworks. We were not able to have sparklers, snakes, red lights and other small combustibles included among those which were prohibited from retail trade. However, this may be done in the future. The Bill was violently opposed by the retail interests, who wanted to have small firecrackers included. This the sponsors refused to do and they were backed up in their stand by the Legislature.

"II. Appropriations amounting to $389,350 were approved for sight-saving classes. This was an increase of $55,450 more than the last biennium.

"The State Department of Public Instruction got $13,000 to cover supervision for special classes in Illinois, which is the first time this has ever been included in the State program.

"III. The trachoma budget was reduced by $6,370 because of the progress in the control of the disease in southern Illinois. This represents one of our quietest but one of our greatest victories. It is not often in these days that a project is carried on so successfully that it is possible to retrench as we have done on the trachoma budget this year.

"IV. The Glaucoma Clinic budget was added to the budget of the Illinois Eye and Ear Infirmary. This amounts to $8,400 and represents an increase for a two-year period of $3,400 above the original grant made by Colonel Sprague for the demonstration work on this project."

—*Illinois Society for the Prevention of Blindness, Chicago, Illinois*

Minnesota

"The educational program of the Minnesota Society for the Prevention of Blindness and Conservation of Vision culminated this summer in the eye course for nurses and medical social workers offered at the University of Minnesota, sponsored jointly by the National Society for the Prevention of Blindness, the State Society, and the Minnesota Academy of Ophthalmology.

"The Executive Secretary has given several short talks before groups of student nurses in private hospitals and before county public health associations. An exhibit was shown, and a demonstration with an eye model was given at a county fair at the request of the agricultural association of that county."

—*Minnesota Society for the Prevention of Blindness and Conservation of Vision, St. Paul, Minnesota*

New Hampshire

"*What New Hampshire Is Doing In General Education To Prevent Blindness.*—In order to promote interest in eyes and proper care of the eyes, the Sight Conservation Consultant of the State Department of Public Welfare has developed many promotional activities. Beginning with the department, she has given consultation service to staff members and given talks to the workers in the department's seven district offices, emphasizing the importance of eye examinations, especially for the preschool child, as well as the school child and adult, and the importance of carrying out the doctor's recommendations in each case.

"New Hampshire has an Interdepartmental Committee consisting of representatives from the State Board of Education, State

Board of Health, and the State Department of Public Welfare. This Committee has discussed the importance of eye care, pamphlets have been distributed, and greater awareness of eye care and more co-ordinated planning have resulted. The picture, 'The Nurse's Responsibility in Saving Sight,' was shown at one of the Public Health Institutes for Health and School Nurses. Since that time, the department has received many requests for the showing of this picture. In the past two years, the picture has been shown, accompanied by a talk and discussion, to the following:

"Four schools of nursing
Two groups of school teachers (high school and grammar school)
One Teachers College (100 pupils)
Pupils of High School (370)
Three graduating classes of schools of nursing
Private organizations which include, Grange, Parent Teachers' Associations, Rotary Clubs, Women's Clubs. Each group which has seen the picture seemed interested and in some instances questions were asked. The general feeling among the groups, however, was that they knew so little about the eye that they did not wish to ask questions. This makes us realize that more and more general education on eyes must be given.
There were meetings with Women's Clubs and Rotary Clubs where it was impossible to show the picture, and we regret this for we feel that there is a wealth of material to be given to the public in the film, 'The Nurse's Responsibility in Saving Sight.'
May we quote a teacher in one of our junior high schools, who said, 'It would be well for every teacher in the state of New Hampshire to see this picture, as it would impress upon one the importance of the eye and the important part the eye plays in school.' A man connected with the University of New Hampshire said in regard to the picture, 'It is one of the finest pictures I have seen on eyes and every child of high school age should see it.'

"We have met with representatives of the Lions Clubs of this district in order to integrate the services of the Clubs with the State's program for the blind and sight conservation.

"In January, 1941, House Bill No. 267, was introduced to the New Hampshire legislature to control the sale of fireworks in the state. A hearing was held in March before the Judiciary Committee and at that hearing the Department of Public Welfare was

represented. While the department did not sponsor the bill, we were extremely interested in it. The bill was put to a vote in the House in March, but was defeated as inexpedient to legislate. An attempt is being made to collect further data on eye injuries from fireworks so that at a future hearing of such a bill, this department will be better armed with telling facts."

—*New Hampshire State Department of Public Welfare, Concord, N. H.*

South Carolina

"It has been stated that had a conservation of vision program been functioning in our schools when our present draftees were entering school, the rejections now being made for this cause would be negligible. The same may be said as to the general education of the public in the matter of eye health and certain eye conditions which terminate in blindness. Therefore, we must agree that any program for conservation of vision or prevention of blindness is a measure in the efficiency of our program for national defense, even viewed as military efficiency.

"Because of this belief, we have endeavored to include some educational features in our program. Lectures have been given at the University of South Carolina by leading ophthalmologists and members of our staff. During the summer school at Benedict College, where all students are teachers, our medical social worker spent a week lecturing to four classes a day, and also instructed a large number of teachers in the technique of taking vision. This was done upon the invitation of the director of the summer school, who was conscious of the fact that nothing had been done in the negro schools toward locating those children who may be facing blindness. Much interest was displayed in these classes and quite a number of students ordered Snellen charts in order that they may conduct screening clinics in their own schools another year.

"Talks have also been made to various other groups, i. e., areal meetings of directors of recreation, county staffs of the Department of Public Welfare, nurses, teachers, civic clubs, etc. There have also been radio talks given by members of our staff.

"As an additional educational feature, we have had booths at the Annual Conference of Social Workers and the State Annual Association of Nurses, at which educational posters were displayed and informative literature distributed. We very definitely plan to extend the educational features of our program another year.

"Case-finding has continued to develop through the usual sources of the Department of Public Welfare, the Department of Health, schools, interested individuals, attendance teachers and screening clinics.

"All cases are referred to the County Department of Public Welfare, which makes the necessary investigation to determine the ability of the client or family to furnish examination and whatever other services may be found necessary. They secure the visual acuity and as the Division only offers medical service to those who cannot afford it themselves, and whose vision is as poor as 20/70 or who have some other obvious existing condition, the number of cases given medical service by the Division is considerably less than those originally referred to it.

"Because of the fact that more cases are being referred to the Division, it has not been deemed necessary to conduct screening clinics as a case-finding procedure though this is an excellent means of interpreting to schools, communities, and to the people themselves. The clinics held were for those cases which were to be followed up through other sources than that of the Division.

"One clinic was conducted in the city schools of Orangeburg, the Lions assuming the responsibility of having the examinations and necessary treatment given those children whose vision was found to be as poor as 20/70, or who had some other obvious condition and whose parents were unable to supply this service. We have just received additional reports on clinics held in Orangeburg County last year, showing that, through efforts of the attendance teacher, 90 children who had previously been tested by the Division had been given necessary treatment through local resources.

"A screening clinic was given for the persons living on Allendale Farm; all necessary treatment will be cared for by Allendale Farm Project.

"We have also conducted a screening clinic for the York Church Home Orphanage; the orphanage will be responsible for all necessary treatment of children who were found to have sufficiently low vision to warrant this service.

"There has been a helpful continuation of the co-operation of Cedar Spring, State School for the Blind, and we feel that the Division and the School are of great assistance to each other in the matter of assisting the children in the state. All new applications for entrance to the school have been referred to the Division for examination and recommendation. This procedure has been made a prerequisite for entrance to Cedar Spring by the Board, upon the recommendation of Mr. Walker, Superintendent. Both the school and our Division are thus assured that no child enters the school until he or she has had an ophthalmological examination and has received every possible treatment which might restore vision. The economic as well as the social value of this co-operation is most important.

"As has been our custom, we have continued to work with the Division of Public Assistance, which Division administers aid to needy blind. Our medical social worker studies their medical records and interprets the medical implication to the Chief of the Division. Those cases which are found ineligible for assistance because their vision is better than 20/200 are referred to the Division for the Blind for whatever medical service may be necessary. There were eight cases whose visual acuity ranged from 20/200 to 6/400, but whose vision could be considerably increased with necessary glasses. In each of these cases the Division for the Blind secured the glasses, which in some instances brought their vision up to normal; in other cases, while not normal, useful vision was given.

"The Division for the Blind has been responsible for 119 operations with the following result:

Operations which resulted in preventing blindness	38
" " " " restoring vision	61
" in which there was no improvement at all	6
" in which the prognosis is doubtful	1
Operations which have been performed but ultimate results have not been obtained	13

"Before concluding this report, we would like to mention briefly something of our study in causes of blindness in the State. This study gives us little idea of the causes, as it is very incomplete. However, the study we will undertake soon will be sufficiently detailed as to give a greater insight to the causes and will also include other data which will be of great interest. The four greatest causes of blindness in the state are as follows: cataract, leading cause; optic atrophy, second; keratitis, third; glaucoma, fourth."

—*Division for the Blind, State Department of Public Welfare, Columbia, S. C.*

Tennessee

"*Sight Conservation Activities in Tennessee.*—On July 1 the Sight Conservation Service completed its third year of service. During this period the Service has been engaged in the following nine activities: various surveys of the blind of the state to determine the prevalent causes of blindness; prevention of blindness to citizens of the state; the restoration of sight to citizens of the state; the finding of children eligible for sight-saving classes; the establishment of sight-saving classes; the establishment of visual corrective programs; the education of the public in preventing blindness; the enactment of suitable legislation to assist in preventing

blindness; and the development of financial resources in various communities.

"From its various surveys of the blind of the state during this three-year period the Service has collected 3,530 cases of blindness and partial blindness which, according to information available to the Service of there being between 4,000 and 4,500 blind persons in the state, indicates to the Service that its various surveys of the blind of the state are now between 78 and 88 per cent completed. According to the combined survey of this group the most important causes of blindness prevalent in Tennessee are as follows:

Causes of Blindness	*Number of Eyes*	*Percentage*
Cataracts (all types but traumatic)	1,251	17.77
Injuries	754	10.70
Sympathetic ophthalmia	126	1.79
Hereditary eye conditions	748	10.62
Acute infectious and contagious diseases	611	8.67
Syphilis of the eyes	512	7.27
Glaucoma	481	6.83
Refractive errors	392	5.56
Uveitis, etiology unknown	360	5.11
Congenital defects	281	3.99
Foci of infection	220	3.12
Ophthalmia neonatorum	219	3.11
Miscellaneous causes (corneal ulcers, cardio-vascular diseases, neoplasms, pterygia, etc.)	544	7.61
Unclassified as to etiology	561	7.85
Total	7,060	100.00

"During the past three years the Service has found 183 children who, because of their serious visual defects, are eligible for enrollment in sight-saving classes. All of these children have had their visual defects corrected as far as possible through the efforts of the Service. The Service expects to find approximately 1,335 children eligible for sight-saving classes when this portion of its work is done, so the Service roughly estimates that this portion of its work is only 13.7 per cent completed. Of this group of 183 children, only 47 are, at present, enrolled in sight-saving classes. Enough children have been found in five communities, one being urban and four being rural, to make the establishment of a sight-saving class in each of these communities economically practicable but, at the present time, the Service has been unable to locate funds in these communities, or to make available from its budget funds for the establishment of these classes.

"Three sight-saving classes have been established in Nashville, two being in the city school system and one at the Tennessee School for the Blind; these care for the educational needs of 47 seriously visually handicapped children. One was established in 1938 in the city school system, one in 1939 at the Tennessee School for the Blind, and the other in 1940 in the city school system. Another class will be established in Chattanooga, and will begin operation in September of this year. When this latter class begins operation, it will bring Tennessee's total of sight-saving classes to five, one being in Memphis, three in Nashville, and one in Chattanooga. During this period five sight-saving class teachers have been trained, funds being made available for this purpose for two by the Centennial Club of Nashville, for one by the Sight Conservation Service and the National Society for the Prevention of Blindness, for one by the Tennessee School for the Blind and the National Society for the Prevention of Blindness, and for one by the Lions Club of Chattanooga. The Chattanooga Lions Club has also made available funds for the purchase of equipment for the Chattanooga class and expects to purchase at least a thousand dollars' worth of equipment for this class this summer. Three of our sight-saving class teachers will have their regular salary supplemented by funds made available by the State Department of Health from the funds available for special education, which fund is administered by the Crippled Children's Service of this state department.

"The need for visual corrective programs for indigent children of the ninety-five counties of our state was known to the Service in the very beginning, but the development of these programs did not begin until the last of the first year. Since that time, fourteen definite visual corrective programs have been established, but two have been discontinued. One of these programs was established during the first year of the Service, two during the second year and eleven during the third year, ten being with Lions Clubs and four with other organizations, these organizations being: a Big Brothers Organization, a Parent Teacher Council, a Kiwanis Club, and a Service League."

—*Sight Conservation Service, State Department of Public Health, Nashville, Tennessee*

Note and Comment

Society's Biennial Conference, December 4–6.—The 1941 Biennial Conference of the National Society for the Prevention of Blindness will be held at the Hotel Astor, New York City, December 4, 5, and 6. A complete program will be available upon request after November 15. The topics which will be discussed during the three-day session are as follows:

Thursday, December 4

9:30 A.M.—Mobilization of State Forces for Prevention of Blindness

12:30 P.M.—Prevention of Blindness from Glaucoma—Medical and Social Aspects (Luncheon Meeting)

4:00 P.M.—Annual Meeting
Principal address by Dr. Frank G. Boudreau

Friday, December 5

9:30 A.M.—Prenatal Factors as Causes of Blindness

10:15 A.M.—Restoration of Sight and Prevention of Blindness

2:30 P.M.—Eyes in National Defense—in Industry and in Military Service

Saturday, December 6

9:30 A.M.—Medical and Educational Provisions for Partially Seeing Children in Rural Districts

11:00 A.M.—Summary and Forecast

Rules for Good Lighting.—"Good lighting requires freedom from glare, the elimination of shadows, and the avoidance of sharp contrast between lighted articles and their background," writes the *Consumers' Guide*, publication of the Consumers' Counsel Division of the Department of Agriculture.

"Glare is misplaced brightness. It can usually be minimized by

shading the light bulb with a material that softens the light, and by placing the light well above the level of the eyes. Milk glass or plastic bowls are anti-glare; so are shades made of parchment paper or light-weight, light-colored silks.

"Reflected light may cause glare too. Mirrors, pictures, table tops, glossy paper, shiny objects, may throw dazzling light into the eyes. Sometimes you can just remove the offending object; sometimes it means covering a glass-topped table or a too shiny table top or desk.

"The darker the paint on your walls and ceilings the more light you need for seeing. Lightness of ceilings particularly is crucial where modern upward shining indirect lighting is used. Paint finishes on walls and ceilings should be dull. Dullness diffuses an easy, comfortable light while glossy finishes cause glare.

"Sharp contrasts in lighting come from a bright light that shines on an object in an otherwise dark room. The sharpness can be smoothed down by using general illumination in a room as well as a brighter light which shines on your book or your sewing or the children's lessons.

"Most lamps give both direct and indirect light, the direct light giving light right on what you are doing, the indirect light furnishing general illumination to cut down shadows and to round off sharp contrasts."

Eye Hazards in Industry—Extent, Cause and Means of Prevention.—Under this title a book by Louis Resnick, until his recent death Director of Industrial Relations of the Society, has just been published by Columbia University Press. The volume, completed just three days before Mr. Resnick's death in March, 1941, contains a complete summary of eye hazards existing in American industry today, and is based upon two decades of experience in this field.

Approximately 300,000 eye injuries occur in this country's factories, mills, mines, and workshops every year, the author explains, and cost the employers more than $100,000,000 annually. They cost the injured workmen and the communities in which they live an additional $100,000,000 yearly. To quote:

"Most of this $200,000,000 annual loss and most of the human suffering resulting from these eye injuries—98 per cent, in the

opinion of those who have made the most detailed study of the subject—are wholly unnecessary.

Of the 1,000 eye injuries which will occur today, all but 20 could be prevented. Conditions observed during the past twenty years in American factories, railroads, and other work places lead inevitably to the conviction that accidents are not inherent in industry, and that the dividends on investments in accident prevention may be proportionately greater than the dividends on the primary business of an industry.

There is no need for the blinding of workers in American industry. The industrial accident and disease hazards affecting the eyes are now commonly known. Methods of eliminating these hazards or of protecting workers against them have been thoroughly demonstrated. Devices which provide protection against almost every type of eye accident are now available.

There are in the United States today more than 80,000 persons who have lost the sight of one eye as a result of industrial hazards and close to 8,000 who have lost permanently the sight of both eyes as a result of these accidents. To this total there is probably added each year 1,000 more who lose the sight of one eye and a hundred or more persons who lose the sight of both eyes as the result of occupational hazards.

The number of men and women who have lost permanently part of the vision of one eye or of both eyes as the result of industrial accident or health hazards undoubtedly runs into hundreds of thousands, and this total is augmented each year by a number probably in excess of 10,000.

These are conservative estimates even if it is assumed that the records on which they are based represent a complete reporting of industrial eye injuries. We know, however, that the injuries reported are only a part of the total number of eye injuries which actually occur. In many instances the injured worker does not know he is entitled to compensation, and no one enlightens him.

Often the seriousness of an eye injury or the fact that it has or will result in permanent loss of vision does not become apparent until long after the injury has occurred, and in many such cases, for one reason or another, no official record of the accident is made. In still other cases the worker is more concerned about the security of his job than in possibly compensation for an injury, and so he does not press his claim for compensation.

More serious than all the foregoing among the factors contributing to the inadequacy of official records of eye injuries is the rapidly spreading use in industry of poisonous chemicals and other deleterious materials which cause damage to the eyes. In many instances neither the workman whose eyes have been affected nor

his physician knows that the worker has been exposed to poisonous fumes, liquids, or dusts.

In many other cases damage to the eyes develops after the worker has left the employment of the company in which he, knowingly or unknowingly, worked with or near poisonous substances. In either event the true cause of blindness or of other serious damage to the eyes does not become a matter of record in the state industrial commission or in any other source of data concerning industrial injury or diseases.

Of the estimated 300,000 eye injuries occurring in American industry each year, 60,000 are compensable, and cost the employers more than $20,000,000 annually for compensation and medical care, Mr. Resnick's study reveals.

Accepting the ratio of hidden or indirect costs of industrial accidents to direct costs of compensation as four to one, the total annual cost of compensable eye accidents amounts to $100,000,000, according to the report, which adds that all or most of this sum is ultimately paid by the consumer, the public at large. On this subject the author wrote:

"Some further idea of the huge financial loss resulting to employers and employees from preventable eye injuries lies in the fact that eye injuries lead to the loss of more than 53,000,000 man-hours of work yearly.

"Little progress has been made in bringing to workmen a realization of what accidents cost them in lowered earning capacity and of the money saving they can make by doing their part in safeguarding their eyes. Few workmen, for example, realize that the maximum compensation for total loss of vision of one eye is less than $2,000 in most states, and as low as $1,000 in some.

"How many American workmen would be willing to sell both eyes for $6,000 or less, the maximum compensation payable for loss of sight of both eyes in a majority of states? Few workmen realize that they are risking a 33⅓ per cent cut in salary for the rest of their lives every time they risk an eye injury. In the most liberal states the maximum compensation paid for total loss of vision is two-thirds of the wage received by the injured workman at the time of the accident. In some states, as in Oregon, the maximum compensation for total loss of vision is as low as $30 a month for life.

"Practically all the financial loss and the human suffering resulting from the blinding of industrial workers could be averted by the co-operation of employers and employees in the utilization of dem-

onstrated methods of preventing accidents and diseases. Not only would these losses be averted but also efficiency and the earnings of both employers and employees would be substantially increased if all industry did what is being done successfully in a few plants in America to prevent eye injuries.

"The obligation to put into effect the methods, devices, and practices which experience has demonstrated to be successful in protecting the eyes of workers belongs to many groups. It is an obligation first of all on the owners and managers of industry and on all their executives and sub-executives. It is a responsibility of employees individually and collectively through their labor union and other organizations concerned with the health and welfare of workers.

"It is an obligation of government administrators—Federal, state, municipal, and county alike. It is an obligation of public and private health and welfare agencies which have any contact either with industry or with industrial workers. It is most directly the responsibility of all those professionally concerned with or having an opportunity for the protection of eyes and of general health, including safety engineers, safety inspectors, industrial physicians, ophthalmologists, general physicians, surgeons, nurses, and local sight conservation agencies."

The book, 350 pages, including illustrations, charts and tables, may be ordered from Columbia University Press, Box D-824, 2960 Broadway, New York, N. Y. Price, $3.50. A descriptive folder will be sent by the Society, upon request.

Civil Service Lists Visual Acuity Requirements in Examination Announcement.—It is of interest to note, in Form 154 of the U. S. Civil Service Examination for Teacher in Indian Community and Boarding Schools, that the visual acuity of the applicant is taken into consideration along with other physical abilities. The requirements are quoted herewith:

> Vision must be at least 20/30 (Snellen) in one eye, glasses permitted, and at least 20/200 (Snellen) in that eye, without glasses; except that persons whose vision with glasses meets the requirement named above, but whose vision without glasses is less than 20/200 (Snellen) in that eye will be suspended, and they will not be eligible for appointment until satisfactory evidence has been presented to the Commission showing that there is no disease or defect of the eye other than an error of refraction.

The Association for the Prevention of Blindness, Bengal.—The Tenth Annual Report, for 1939–40, of this Association has recently arrived in our office. Census returns in 1931 showed a total of 37,399 totally blind in Bengal and the report states that, for every person blind, there are three partially blind. The Association is now sponsoring an actual count of the blind in villages by trained eye doctors, and at present the blind in four hundred villages are known.

The aims of the Association are fourfold: first, to educate the people by means of posters, pamphlets and lantern slides; second, to establish travelling eye dispensaries to tour the different districts in Bengal; third, to recommend legislation on compulsory vaccination, prophylaxis against ophthalmia neonatorum, notification of venereal diseases, regulations against adulteration of food and drink, and against quacks and indiscriminate advertisements; and fourth, with regard to training in ophthalmology, to make ophthalmology a compulsory subject in university curricula and to urge that facilities be given to general practitioners trained in ophthalmology to work in recognized hospitals and dispensaries. Although the Association has been successful in carrying out the greater part of the program, nothing so far has been accomplished with regard to the legislation but, as public opinion is being gradually aroused, it is hoped that advances in this line will be made shortly.

From the beginning it has been the ambition of the Association to operate five travelling dispensaries in the five divisions of the Province so that education and modern treatment might be brought to people in remote villages. Two have been in operation for several years, and in 1939–40 the government sanctioned a grant for three years to start another two under the auspices of the Association. The demand of the public is so great that one dispensary worked nearly a year in one district instead of the three months that were scheduled for its work. These dispensaries listed among the commonest causes of blindness glaucoma, cataract, keratomalacia, couching, smallpox, venereal diseases, corneal ulcers from paddy leaves, and dust not properly treated in time.

The Association also sponsors an Eye Examination and Lecture Unit, the activities of which are mainly preventive. Besides lec-

tures in the schools, the Unit last year carried out systematic eye examinations in 8 high schools and 3 orphanages. They examined 2,102 students; of these, 680 students (32 per cent) were found to have various eye defects.

The Association also has two different sets of slides for lantern lectures on care of the eyes and prevention of blindness, and the travelling dispensaries and the Eye Examination and Lecture Unit each possess a set of each. They also have a film, "Lamps of Life," publications printed both in English and Bengali, and posters to aid in their campaign of educating the public.

Tests for Color Blindness in School Children.—Testing for color perception in the school child is important in order that all children who are color blind may be guided regarding traffic signals, and later vocationally. One test is sufficient for the entire school period as color blindness is a hereditary defect which cannot be changed. The American Medical Association has recently advised that the Army has discarded both the Ishihara and Stilling charts for color-blind testing and now relies entirely on the old-fashioned skeins of yarn, and that the Medical Corps of the Army now uses the Holmgren yarn test. The New York State Division of Health and Physical Education suggests that schools follow this advice until more definite standards are developed.

Eyesight in the British Army.—The British Army, realizing the importance of careful attention to a man's eyesight, has called in some of the best ophthalmic specialists in the country and has made available all the latest scientific equipment to assist the ophthalmological branch of the R.A.M.C.

Most of the work is concerned with examining men for spectacles. In the Northern Command alone, over 4,000 cases are dealt with a month, states the *Optician*. Of the 19 age group, only five or six per cent were sent up for examination, but from the 35 age group as many as 20 per cent in some units needed attention. On the average, it has been found that glasses will give definite improvement to two-thirds of all men inspected.

Every soldier that needs glasses is provided with two pairs, in the event of breakage in action. As ordinary glasses cannot be worn with a gas-mask, since they prevent the face piece from fitting

tightly to the side of the face, soldier's spectacles are manufactured with thin, flat sides. Experiments have been made with plastic lenses, but it has been found that they are too readily scratched; further experiments are now being instituted to get plastic lenses with a harder surface.

Eye Defects and Selective Service.—A recent *U. S. Public Health Report* states that, of the 32 per cent of men rejected after physical examination by the Selective Service local boards, 18.6 per cent are rejected for defects of the teeth, 10.6 per cent for defects of the eyes, and 10.1 per cent for cardiovascular defects. Of the 13 per cent rejected at the induction stations, 13.3 per cent are rejected because of eye conditions. The groups of defects of the eyes and teeth, hernia, and over- and under-weight account for a considerably higher proportion of the total number of defects in the limited service classification than in the disqualified classification.

March, 1941, Review in Demand.—We should be glad to extend the subscription for a quarter of a year to any one who would return the March, 1941, issue of the REVIEW when finished with it. Our supply is completely exhausted, and the demand for this issue is heavy.

Current Articles of Interest

Vitamin B in Ophthalmology, Clarence A. Veasey, Jr., M.D., *Archives of Ophthalmology,* March, 1941, published monthly by the American Medical Association, 535 North Dearborn St., Chicago, Illinois. The author briefly defines the various components of the water-soluble group of vitamins and reviews the ocular effects of avitaminosis B with respect to both clinical and experimental ophthalmology. Extensive references are cited. Dr. Veasey points out that benefit from the administration of vitamin B in ophthalmologic practice can be expected in cases of toxic amblyopia, retrobulbar neuritis, certain corneal conditions, Wernicke's disease and similar depletion syndromes, and possibly in cases of uveitis and chorioretinal involvement of unknown cause. Although there is ample evidence to show that administration of riboflavin will arrest cataracts in riboflavin-deficient animals, experience with man has failed to demonstrate that a similar effect occurs in the human being, with the possible exception of arrest of the swelling of the lens in cases of intumescent senile cataract.

Of the complex, thiamine relates to neuritis without degeneration; riboflavin deficiency leads to degeneration of nerve tissue; nicotinic acid is involved especially with relation to the skin and mucous membranes, cerebral symptoms and the eighth nerve; and the remainder of the complex undoubtedly plays a part in human nutrition that is as yet undetermined. He emphasizes the fact that the administration of one component of the vitamin B complex tends to deplete the supply of the others and therefore the administration of one fraction should be supplemented by the administration of the whole complex.

Dr. Veasey concludes that subclinical avitaminosis is widespread among persons of all classes and may have unsuspected clinical manifestations. He indicates that persons with ocular disease in whose cases the dietary history or the general symptoms suggest the possibility of vitamin deficiency should receive the benefit of vitamin therapy, either for a specific effect or as an adjunct to other treatment.

Nonspecific Protein Therapy in Ocular Disease, Theodore E. Sanders, M.D., *Journal of the Iowa State Medical Society,* February, 1941, published monthly by the Iowa State Medical Society, 506 Bankers Trust Building, Des Moines, Iowa. Although the use of foreign protein therapy as a general therapeutic measure has lost some of its former popularity, Dr. Sanders states that its use in ophthalmology has increased until it is now one of the most valuable procedures in ocular therapy. Foreign protein therapy has been found to be of greater value in inflammation of the uveal tract than in any other tissue of the body. It tends to shorten the course and reduce the permanent damage of many of these inflammations. In severe iritis and iridocyclitis, particularly in acute stages, the use of intravenous typhoid vaccine is almost routine, and lesions of gonorrheal origin seem to respond especially well to the therapy.

Next to iridocyclitis, the author states that foreign protein is most valuable in the management of ocular trauma. It has proved to be so effective in infected cases that an injection is often given as a prophylactic measure to apparently uninfected cases of perforating injury. This tends to abort the infection in the preclinical stage before it has an opportunity to develop. On the same theory it has been suggested that foreign protein therapy be used 24 to 48 hours previous to any intra-ocular operation. This method of treatment is also of value in cases of corneal ulcer, severe interstitial keratitis or phlyctenular keratoconjunctivitis, optic neuritis and retrobulbar neuritis.

Dr. Sanders states that foreign protein therapy is easy to use and not dangerous. Although innumerable substances have been used to cause the reaction, he at present is using only four agents: typhoid vaccine, typhoid antigen "H," milk and omnadin. The choice of the agent depends on the patient and conditions under which he must be treated. If the patient is in good health and in the hospital, typhoid vaccine is the method of choice, as a marked reaction is essential if the most benefit is to be received; if an effective but less marked reaction is desired, because the patient is not hospitalized or is not in good health, antigen H is indicated; in children under five years of age, milk is used; omnadin is used only in those cases in which all other agents are contraindicated. The author emphasizes the fact that large enough doses should be given

to cause definite general reactions, as the therapeutic results to be expected are in direct proportion to the degree of reaction.

Measurement of Fusion Frequency of Flicker as a Test for Fatigue of the Central Nervous System, Ernst Simonson and Norbert Enzer, *Journal of Industrial Hygiene and Toxicology*, February, 1941, published monthly, except July and August, by The Williams & Wilkins Company, Mount Royal and Guilford Avenues, Baltimore, Maryland. Although the importance of fatigue of the central nervous system from an occupational point of view has long been realized, only a few attempts have been made to develop suitable methods of investigation. As there is evidence that fatigue develops first in the sensory centers, from which it spreads to involve the whole nervous system, the authors chose as a method of investigating central nervous fatigue a study of a fundamental sensory function, the fusion frequency of flicker. This is that rate of successive stimuli (light flashes) which is just necessary to produce complete fusion and the same effect as continuous illumination. A known rotator arrangement was used so that the beam of light from an electric bulb was interrupted by a rotating disk with four identical openings. The speed of the rotator was increased until fusion occurred and was then measured by means of a stop watch and a revolution counter. The fusion frequency of flicker was determined in a group of hospital employes, whose work was the usual daily laboratory or office work in which muscular effort was negligible. Values at the beginning and at the end of the same working day, and in a different state of fatigue in the morning or evening on different days, were compared.

The authors cited several points of merit of this method of testing: the values could be reproduced with high accuracy; the method, although a subjective one, has the accuracy of an objective one; the subject does not know the significance of discriminating flicker nor the actual speed of the rotator as regulated by the experimentator; discrimination of flicker cannot be improved by training; and a minimum of co-operation is necessary, as the subject has only to say whether or not he sees the flicker.

Book Reviews

THE EXTRA-OCULAR MUSCLES. Luther C. Peter, M.D. Third Edition. Philadelphia: Lea and Febiger, 1941. 368 p. ill.

There is no domain in ophthalmology which permits a wider approach to its problems than "The Clinical Study of Normal and Abnormal Ocular Motility"—the subtitle of the volume under review. The work, while addressed primarily to the physician who still regards himself a student approaching ophthalmologic problems, gives a refreshing and stimulating survey to the one who has achieved more complete mastery of the specialty. Unless engaged in teaching in a clinic or school the practitioner develops a routine which may have many short cuts. These will find in a careful perusal of Peter's work, suggestions of finer detail and newer technique which may supplement what have grown to be deficiencies in his own daily office methods. This reading will also emphasize the amount of detail involved, not only in the analyses of so-called "muscle cases," but still more in the orthoptic and non-surgical handling of the patient to achieve the larger percentage of successful outcome in these cases. Dr. Peter has elaborated on the various methods by which to reach a proper understanding of the imbalance problem in a particular case. Based on this will be the scheme or plan of treatment. That surgery is no longer the first or early choice, where formerly it was, goes without saying. But non-surgical treatment—"orthoptic training" —calls for such an amount of time that few busy ophthalmologists can be expected to carry this out personally,—it is a matter for a properly experienced technician or assistant. One gets an appraisal of the high value of this work by the evidence in its pages of the author's capacity for painstaking detail.

Very properly the volume covers: Part I, "Anatomy and Physiology"; Part II, "Heterophoria"; Part III, "Heterotropia or Concomitant Squint"; Part IV, "Paralytic Squint"; Part V, "Nystagmus or Talantropia"; and Part VI, "Surgical Technique."

In these chapters, where facts are agreed upon, but where the approach has been from different angles with some difference in

explanation, there appear necessarily some differences in technical nomenclature, but nowhere is the reader left without a proper grasp of the author's meaning.

Because the subject of neuro-otology, as manifested in vestibular nystagmus, has risen to so much importance, it is a valuable inclusion in this volume to have the chapter on "Nystagmus" (now designated Talantropia) include some informative paragraphs on this reaction, which should be familiar to all physicians and to the ophthalmologist along with the otologist and neurologist.

The chapter on "Surgical Technique" will be helpful to all readers as giving the author's methods, but more especially to those not in contact with ophthalmic clinics of the first rank.

The volume should be in the library, and deserves to be on the desk of students desiring to keep abreast of this important and yet growing field of work, and should be in the hands of the *equipped* ophthalmologist.

—John E. Brown, M.D.

Civil Service in Public Welfare. Alice Campbell Klein. New York: Russell Sage Foundation, 1940. 444 p.

Those who in the past have hopefully watched the launching of plans for sight conservation under public auspices only to see the plans wrecked among the rocks and shoals of politics find the new development of state merit systems the most encouraging trend in Government today. The stability inherent in a well-run civil service system is a prerequisite to shaping an effective prevention of blindness program since such a program is always dependent on efficient public servants in both the departments of health and welfare. The amendment to the Social Security Act requiring that state personnel handling federal funds disbursed under the Act be selected by a merit system makes it important for all inquiring citizens to understand what constitutes a good merit system and how to get one.

In her recent book, too modestly described as a primer by Mrs. Klein, she gives a fairly comprehensive description of the accumulated experience of more than fifty years of civil service administration in this country. The writer has emphasized the basic principles, the essential elements for method of personnel selection for

public welfare services and how to safeguard it. The book is divided into two parts: the first entitled, "Civil Service, Its Functions and Procedures," which includes a chapter on Common Forms of Inroads on Merit Systems; and the second, entitled, "Where Social Work and the Merit System Meet." This section will be particularly useful to anyone who is collaborating with a civil service commission in developing examination questions as it takes up many practical aspects of testing for any field.

This book will be valuable to teachers and the students not only as a text but as a reference book. The style is clear and readable. The rather full table of contents and index make the material easily available. The bibliography makes the book a good stepping stone to further study of a well developed method not sufficiently understood.

—Elizabeth G. Gardiner

Modern Trends in Ophthalmology. Frederick Ridley and Arnold Sorsby. London: Butterworth & Co., Ltd., 1940. 699 p. ill.

This book is different. The authors' idea was to present modern trends in ophthalmology as they originate in the clinics of various countries, and for that purpose they have enlisted the aid of authoritative clinicians from three continents. The list of contributors is impressive. Much of the material is necessarily post-dated by articles in the current magazines, but the reader will have a satisfying feeling that the old textbook didactics have been clothed in modern dress. Although there is naturally a closer correlation with the basic sciences and with medicine as a whole, the main viewpoint is a practical one, and the reader need not fear any over-simplification of the special problems involved in ophthalmology.

There is no attempt to cover any subject exhaustively, but rather to present newer facts and interpretations.

The beginner would be better advised to acquaint himself with the broad canvas of his subject before trying to draw the picture with these new colors alone.

For the practicing ophthalmologist, however, the added highlights will give his subject a greater feeling of solidarity and relief. Glaucoma, for example, is discussed by different authorities in rela-

tion to general vascular disease, heredity, psychological factors, and the preglaucomatous state. One cannot read without questioning or revising his own concepts. Herein lies the greatest value of the book.

The material is divided into seven parts, as follows: (1) Ophthalmology in relation to General Medicine; (2) Diagnostic Procedures; (3) Refraction and Binocular Vision; (4) Physiology of Vision; (5) Some Newer Concepts in Pathology; (6) Treatment; and (7) Social Aspects.

Any further attempt to discuss the subject matter is frustrated by the wealth of material presented and by the different points of view.

The type is clear and the illustrations are excellent. Good indexing and references make the subject matter easy to find and to follow up.

—Willis S. Knighton, M.D.

Neuro-Ophthalmology—A Text Book and Work of Reference, R. Lindsay Rea, M.D. 2nd edition. St. Louis: C. V. Mosby Company, 1941. 600 p.

When the various specialties in the practice of medicine were developing in this country, the study and treatment of the affections of the eye, ear, nose and throat were, in some unaccountable way, grouped under a common head. However, since Helmholtz, through the invention of the ophthalmoscope in 1851, has made possible the study of the background of the eyes, and Förster, five years later, offered the means of estimating accurately changes occurring in the visual field, rapid strides have been made in the study of eye symptoms as they relate to affections of the cerebro-spinal nervous system and a greater inter-relationship between ophthalmology and neurology has been established. A neurological examination is no longer considered complete without a physical and functional ocular study, and we find today many of the neurological hospitals equipped with ophthalmic departments.

The recognition of the interdependence of diseases of the nervous system and the eyes has created a demand for books of reference and text books relating to these subjects. One of the most complete and readable text books of the kind was published in 1938 by Rea

and has recently appeared in a second edition. In this the author, rather than reconstruct the entire text of the original issue, which has met with encouraging reception, decided to supplement the text of the first edition by the addition of approximately 100 pages and thus bring the subject matter up to date.

The introductory chapters are devoted to the anatomy, physiology, motor structures and nerve supply of the eyes, and to the methods of examination. A concise description of the visual pathways and the cortical centers is given as a preliminary to a chapter devoted to the localization of lesions of the tract and brain through perimetric study. Ophthalmoscopic description of the normal fundus and changes significant of affections of the nervous system are given due consideration, particular attention being given the diagnosis and localization of brain tumors, cysts, abscesses and head injuries such as fractures, intracranial hemorrhage and aneurysms. In a separate chapter the author takes up constitutional diseases and affections of the nervous system as they are manifested in ocular signs. Tumors of the orbit and optic nerves are given special consideration, as are congenital abnormalities.

The entire subject matter of this attractive text book is handled in the careful and thorough manner which characterizes the works of our English contemporaries. The text is elucidated by 196 illustrations, consisting of well executed schematic drawings, some in color, and of photographs and reproductions of fundus pictures. Mention should also be made of the appended comprehensive bibliography.

The publication of Rea is one which should be found in the library of every one interested in ophthalmology and neurology, and which would also prove invaluable to the internist and general surgeon. The publishers, who have gotten out this volume in their usual efficient way, are to be congratulated in having secured the rights to this publication.

—Adolph O. Pfingst, M.D.

Social Work Year Book. Russell H. Kurtz, Editor. New York: Russell Sage Foundation, 1941. 793 p.

Social Work Year Book opens its section on Blindness and Conservation of Sight by pointing out that the problems of welfare

work for the blind and work for sight conservation differ in so many respects that it is desirable for the two programs to be organized separately. The section then proceeds to show the different scope of each field and the necessity for each to be carried on by its own highly specialized personnel.

It seems regrettable, therefore, that the two programs are presented as one section of *Social Work Year Book*—the accepted "encyclopedia . . . of 'organized activities in social work and related fields.'"

The scope of a program for the conservation of sight and prevention of blindness is presented with enviable conciseness by C. Edith Kerby, Statistician of the National Society for Prevention of Blindness. She comments on the major problems of prevention: the need for intensive research into etiological factors; the fact that one-fourth of blindness is caused by "infectious diseases"; the fact that accidents are responsible for nine per cent of blindness in children and thirteen per cent in adults; the large part played by general diseases causing blindness.

Suggestions for meeting these problems follow: adequate treatment for the arrest or correction of eye lesions; control measures for communicable diseases; co-operation of individuals with serious anomalies of the eye for the control of hereditary blindness; maintenance of general health and nutrition as the ounce of prevention which may protect the eyes from disaster.

It is brought out that prevention of blindness should be the responsibility of all existing community services, and organized prevention of blindness agencies should stimulate and co-ordinate these community efforts.

Miss Kerby has made an excellent digest of the mass of activities composing a well-rounded program for sight conservation. One wishes, however, that more of the growth of the program in relation to human and medical needs had been given.

—Mary Hopper Spencer

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

359. Tell-Tale Eyes, A. L. Kornzweig, M.D. 8 p. 5 cts. Discusses the eye as an indicator of conditions affecting the general health of the individual.

360. Helping America by Saving Sight in Childhood, Through Integration of Services, Theodate Haines Soule. 12 p. 10 cts. Shows how departments of health, welfare, education, and other agencies are integrated to conserve sight.

361. Helping America by Saving the Sight in Childhood, Through Health Services, Roger E. Heering, M.D. 12 p. 10 cts. Presents what already has been accomplished through health services in the conservation of vision movement.

362. Children's Eyes, Willis S. Knighton, M.D. 12 p. 10 cts. Discusses development of the eye, refractive errors, binocular vision, and eye diseases and injuries in childhood.

363. I Live in a Sighted World, Milo Gilliland. 8 p. 5 cts. Describes the experiences and problems of a partially sighted individual.

D145. Visual Efficiency, Henry A. Imus. 8 p. 10 cts. Describes the refractive, muscular, and nervous parts of the visual apparatus and discusses some structural and functional disturbances. Reprinted from *Hygeia*, April and May, 1941.

D146. Strabismus in Children, J. Conrad Gemeroy, M.D. 4 p. ($1.00 per C; $7.50 per M.) Discusses causes and treatment of this condition. Reprinted from *American Journal of Nursing*. May, 1941.

D147. Eye Health in the Basic Curriculum, Carrie H. McNeill, R.N. 4 p. ($1.00 per C; $7.50 per M.) Presents possibilities of integrating eye health teaching with other courses in the basic curriculum. Reprinted from *American Journal of Nursing*, September, 1941.

D148. Observations on Eyegrounds of the Newborn, M. Luther Kauffman, M.D. 8 p. 5 cts. Discusses results of examinations of over three thousand infants' eyes. Reprinted from the *Pennsylvania Medical Journal*, September, 1941.

Contributors to This Issue

Dr. Abraham L. Kornzweig is a practicing ophthalmologist in New York City, and is on the staffs of Mt. Sinai Hospital, the New York Eye and Ear Infirmary, and the New York Post-Graduate Medical School, Columbia University.

Roger E. Heering, M.D., is Past Assistant Surgeon of the U. S. Public Health Service, and is assigned to District No. 1, New York, N. Y.

Theodate Haines Soule is the director of the Social Service Department, New York Hospital, N. Y.

Dr. Willis S. Knighton needs no introduction to REVIEW readers. Besides being on the staff of the New York Eye and Ear Infirmary, Dr. Knighton is a member of the Society's Advisory Committee.

Charles F. Kutscher, M.D., is the consulting ophthalmologist for the Carnegie-Illinois Steel Corporation, Pittsburgh, Pennsylvania.

Book reviewers: **John E. Brown, M.D.,** is a Referee of Eye Claims for the Ohio Industrial Commission and Ophthalmologist for U. S. Employees' Compensation Bureau at Columbus, Ohio; **Elizabeth G. Gardiner** is medical social worker on the Society's staff; **Adolph O. Pfingst, M.D.,** is professor emeritus in ophthalmology at the medical school of the University of Louisville, Kentucky; **Mrs. Mary Hopper Spencer** is executive director of the District of Columbia Society for the Prevention of Blindness, Washington, D. C.

The Society's Conference and What It Indicates for the Future*

Iago Galdston, M.D.

"YOU can't cure the eye without healing the head, nor the head without healing the body," quotes Dr. Galdston in summing up his discussion of the papers presented during the Society's biennial conference.

TO DO full justice to the title assigned me, I would need to be possessed of an encyclopedic intelligence and of the competence of a prophet. Palpably, I qualify in neither regard. If however, the burning of midnight electricity and the stubborn application to the stack of papers you see before me—a stack which includes all but one of those delivered at this conference—are any warrant at all, then I am in small degree entitled to present a summary of the transactions of this conference. This I do in the spirit of the late Heywood Broun, who headed his column, "It Seems to Me."

May I begin my summary and review by touching on something which, because it is very obvious, is most likely to be overlooked? This very splendid conference—and I say splendid with full appreciation of its connotations and with a full sense of propriety of applying that term to this conference—is, I beg you to note, conducted by the National Society for the Prevention of Blindness, a Society with a splendid history, a Society which in origin and function is, and I hope will remain, a voluntary organization.

We have gathered here, without distinction, prejudice, or awe, representatives from universities; foundations; medical schools; medical societies; local, state, and federal health departments;

* Presented at the Biennial Conference of the National Society for the Prevention of Blindness, December 6, 1941. The papers mentioned in this discussion will be available in printed form.

social work organizations; teachers; and industrial groups. These representative elements have commingled both in the audience and on the program in a precious and smooth way. They have all come together to contribute their knowledge and their experience that there might be brighter light and better vision in this world.

In bringing this obvious matter to your attention I have, of course, a motive which I will confess to you at once. My motive is to use this "dissertation on the obvious" as a springboard from which to plunge directly into the substance of the first paper delivered to this conference. This was the contribution of Professor John W. McConnell, a paper which has a long title but which on the program was intelligently bobbed so that it read "Legal Authorizations." Professor McConnell's paper was scholarly, studied, and labored. I desire to call your attention to two fundamental considerations, more implied than expressed by the author. These considerations are as follows: one, that it is up to the government to do a job; and the other, that there should be, and here I quote from the paper, "legal authorization for positive action." Both of these deserve careful and critical reflection.

Since we have acquired the habit of combining the alphabet in all sorts of hieroglyphic designations of governmental agencies, there seems to have developed a universal inclination to take it for granted that "it is the government's *obligation* to do." Because of the tension of the times there seems to be a psychological regression, a tendency to fall back from the adult attitude of self-reliance to a state of dependency upon the Father. As a corollary to this stands the second item, the state of anxiety or impatience which calls for "legal authorization for positive action." This is no more than a devious way of saying, "You will either do it according to the law, or by 'yumpin' yimminy!' "

Now, I confess to you that I feel strongly about these tendencies, for I see that, if they are permitted to expand beyond the limits of historic reasonableness and sober reality, they menace just such splendid institutions as the one under whose auspices we have foregathered during the past three or four days. During the last decade we have suffered what was once beautifully described by Murray Gilbert, in writing of the decline of Greek civilization, as a *loss of nerve.* It seems to me that, notably in the field of health

education, there has been experienced a loss of nerve, a loss of faith, a loss of confidence in the competence of individuals, collectively and on a voluntary basis, to do the things which they know need to be done. We seem to be looking to some bewhiskered non-existing entity called "Popper" to do those things for us under the injunctions of law.

Would you have me tell you which of the sessions of this conference I consider to have been the most illuminating? It was the dinner given in honor of Mr. Carris. Why? Because, as Mr. Carris himself said after he was laden with compliments, he stood there as a symbol in part of the past, of the men and women who had the vision and the courage and hope and self-confidence to initiate and carry on the work of the Society. He stood there also as a symbol of the future, for, as he looked about him, he saw those who, with like courage and like vision and like enthusiasm were ready to carry on. I say that to me *that* was one of the most impressive of the sessions because it embodied and expressed the spirit which made our civilization—the spirit which has engendered and guided our democracy, the spirit to which we pay tribute when we sing our national anthem.

I recall in this connection two of the greatest speeches known in the history of mankind, speeches that are the quintessence of that which we prize. One was delivered by Pericles, more than two thousand years ago, over the dead of Athens. The other was Lincoln's Gettysburg Address. Two thousand or more years passed between the deliverance of those speeches, but the spirit is the same. And in both instances, at crucial times in mankind's history, men of keen intelligence stood forth and said, "It is ours to dedicate ourselves to a task for which the best of men have lived and died." Both Pericles and Lincoln said, not "It is the government's," but "ours"—the task.

It is interesting that in the other papers of the program the consistent emphasis was not on the need for "legal authorization," but rather on the urgent need fully to utilize and apply the information and vast knowledge, the established techniques and proved methods for the prevention of blindness and conservation of sight. Take, for instance, the papers of Dr. Schoenberg and Dr. Sullivan. Both of them dealt with glaucoma. The control of this disorder, its

early diagnosis and its medicinal and surgical treatment, are well known to us, yet 10 per cent of all blindness is still caused by glaucoma. One hundred thousand people are partially blinded by it. Do you believe that the passage of any new law or the enactment of any compelling act would serve to improve these conditions? I doubt it. What we need here, as elsewhere, is more intensive education.

I think it were well for us to remember that life is not in its ways logical, but rather psychological. I call in witness this interesting and rather amusing point. Mr. Hayes, in his paper, "Restoration of Sight and Prevention of Blindness in Adults," described the excellent work that has been developed in Kansas. When he reported upon the results of his work, he expressed himself in the following terms: such-and-such a percentage of those who received treatment were "rendered ineligible for aid to the blind." There you have an example of "human psychology." Fancy, for comparison, an orthopedist reporting on the effectiveness of his work in terms of "individuals now rendered ineligible to use crutches," instead of "able to walk, able to move, able to work, able to earn a living."

Another illustration of how much more we need education than legal compulsion was given in the paper, "Eye Protection in the Defense Industries," by Mr. Haller. How stirring it is to hear the achievements of prevention of accidents and of injuries to the eyes in industry! Think of a workplace in which 90 per cent, nay, even 98 per cent, of all eye injuries have been eliminated. And yet this is but an isolated achievement, for we are told that preventable accidents and eye injuries in industry cost the equivalent of 110 million dollars annually. We are prompted to ask, "Why are these not prevented?" Whatever the answer may be, we know that a maximum of education and a modicum of laws are required to persuade all the persons concerned, from the man who has a say-so to the man who wears the goggles.

Consider again by way of illustration the very fine paper read by Miss Matie Carter, a paper which contains an earnest lesson salted with humor. I feel sure Miss Carter must be a fine cook! Miss Carter discussed "Medical and Educational Provisions for Partially Seeing Children in Rural Districts." You remember she told us of the case of the mother who insisted that her daughter saw

well enough and didn't need any clinic help, even though within a year the daughter lost the vision of one eye. That mother probably didn't tell all of her feelings. I expect that she possibly recalled the rhyme, "Gentlemen never make passes at girls who wear glasses." Again you must recall a story told by Miss Carter of the teacher who wouldn't move the fifth grade boy with defective vision to a seat nearer the window because that was, as she told it, a sixth grade seat. In these two tales we have the quintessence of the matter. Life and people are not logical. They are, to use a vulgarism, psychological.

Let me not, however, overdrive the point. I am not pleading for a state of idealistic anarchism. Perhaps in a few millennia, if humanity doesn't meanwhile destroy itself, our beings may be sufficiently wise and human to do without laws. Today we no doubt require legal sanctions. We can perhaps crystallize our thoughts on this score by affirming that it is the obligation of the civil community, by law or otherwise, to make it possible for the individual to help himself. Where, however, civil government goes beyond this and does for the individual that which the individual should do for himself, neither the interests of the group nor those of the individual are best served.

One other item deserves consideration in this connection. We have from the Latin the injunction, *Caveat emptor*, let the buyer beware! This is valid if the buyer can really beware. If a woman, however, goes into a drug store, buys a hair dye, the contents of which are described in a bastard admixture of Latin and Greek, and if that hair dye contains a noxious substance which may produce a skin inflammation or injure the eye, then she cannot be expected to "beware." It is the government's obligation to safeguard the individual under such circumstances.

May I now turn to two other papers which interested me very much? I refer to the papers by Dr. Schweitzer and Dr. Baumgartner, which dealt with hereditary and prenatal factors causing blindness. In this connection I should like to report to you that only a short time ago I wrote to a half-dozen ophthalmologists in an effort to discover what they knew or thought of the hereditary aspects of blindness. Five of the six responded by saying that they knew nothing about it and didn't think that there was much to be

known. And yet here are two fine papers defining the nature of the problem and indicating the lines along which research and study might be conducted. Of course, when we refer to heredity we must recall that touching definition of heredity, namely, that it is that science which enables us to blame our parents for our own faults. There is much to this definition, for I have found that frequently when a condition is charged to hereditary influences, such designation is only an excuse for not pursuing further a difficult problem.

The papers of Dr. Schweitzer and Dr. Baumgartner were modest and conservative, but some of the discussion that followed tended in part to fly beyond the bounds of reasonableness.

There is in my humble opinion a little too much glib bandying of the term, sterilization. My own feeling is that, save in one or two conditions, such as amaurotic idiocy, we have little warrant for recommending sterilization. I know that the geneticists have done an enormous amount of work with fruit flies and lower animals; but all this work is a far cry from the sterilization of human beings for the prevention of the so-called hereditary diseases. Genetics in the strict sense means germ plasm, and when you speak of germ plasm there is implied a fatal finality. Germ plasm has that about it. As the high school boy said, "Heredity is that about which you can do nothing." But in the so-called hereditary diseases we as yet do not know where the effects of germ plasm end and those of environmental influences begin. Of environmental influences we have in mind the prenatal as well as the postnatal. Until we know more about these matters, let us suspend all talk about sterilization.

I won't elaborate further on the papers of Dr. Schweitzer and Dr. Baumgartner, save to offer congratulations to the speakers for their presentations and to this conference for its foresight and good fortune in obtaining such excellent contributions.

I must now touch briefly on Mr. Hayes' paper, offering my apologies for the fun I poked at the "ineligible for aid to the blind" phrase. Mr. Hayes' recitation was an excellent lesson in how to do things right. Mr. Hayes told us how, in the State of Kansas, they have effectively brought together the medical and welfare organizations in a co-ordinated program. In this state they have gained a willing and happy participation of the medical profession by

bringing the medical men in at the very inception of the program. I commend this paper to you as an illustration of how the co-operation of the medical profession is to be obtained.

Having promised to limit myself to thirty minutes, I now find myself obliged to skip quickly over certain of the other papers delivered here—those, for example, of Dr. Gradle and of Mr. Haller. These papers have dealt with eye conservation and defense. I have but one tangential observation to make: gearing things up to defense has its value, but also its hazards. "Defense" smatters a little too much of the Maginot line. We want to work, not only for defense, but for the day after tomorrow—for in the focusing of excessive emphasis upon defense we may lose sight of some of the things for which we are fighting.

Now I come to my last point, one which is dedicated to the future. The history of all voluntary health organizations has a common pattern. A group of enthusiasts, inspired by an idea and possessed with a vision, dedicate themselves to the achievement of something which they feel deserves their devotion. In the natural funneling of energy and purpose of this group is to be found the strength of the pioneers, the initiators, the enthusiasts. While this pattern is most precious at the initiation of the movement, it becomes, as time passes and as the movement prospers, a menace. That menace is *provincialism*, a "nearness of vision," a parochialism in purpose. This is true of all movements, whether they be devoted to cancer, tuberculosis, deafness, blindness, and so forth. Provincialism is essential in their initiation, but beyond that it is cosmopolitanism that promises effectiveness. As we face the future, we must bear this in mind.

It is here that I should like to refer to a paper presented by Dr. Boudreau. How stimulating it was to hear him recite the bearing of nutrition upon eye conditions! That paper was, if you please, an argument for cosmopolitanism. It presented in modern terms the lesson which Plato put in the mouth of Socrates: "You can't cure the eye without healing the head, nor the head without healing the body." We have been urged that those of us dealing with problems of the eye must bear in mind that the eye is set in a human being, that the human being is set in his environment, that the environment is a segment of this complex universe. We can no

more isolate "eye problems" than one can untangle the middle knot of a fisherman's net.

Let me translate this into concrete terms. How many of those who are now occupied with the programs in aid of those with defective vision actually concern themselves with the nutritional state of their clients? How many of those who are interested in vocational re-education appreciate the psychological implications of turning a worker from one occupation to another? With these questions I now turn to summarize my own summary, and this I do in terms of two P's. I beg you to beware of Paternalism carried to the extreme. I beg you to beware of Provincialism carried to the extreme.

Sight Conservation on the Advancing Fronts of Public Health and Nutrition

Frank G. Boudreau, M.D.

DR. BOUDREAU challenges us with the thought that "nutrition may prove to be one of the keys needed to unlock some of the mysteries of eye diseases and conditions which long have baffled us."

MODERN public health work resembles a war of movement. The front is fluid, ever changing. Very often the nature and extent of these changes are not fully appreciated at army headquarters. Hence the war on any particular front may be directed from headquarters, without much reference to the actual situation or to the changes which have occurred or are occurring.

The front of public health is changing because of influences brought to bear on it from various directions. It is influenced by the age distribution of the population with which it has to deal. If that population is largely composed of children, the chief public health problems will be those relating to diseases and conditions peculiar to childhood. If, on the other hand, the population is largely made up of old people, the chief public health problems will be those relating to longevity and senility. These are two wholly unnatural illustrations; no population is biased so strongly in one direction or another. But it is true that significant changes are taking place in the age distribution of the population, and when present trends are projected into the future, drastic changes are anticipated. For one thing we are approaching the period when our population may become stationary. Soon there will be no increase between census periods. It is possible that this failure to increase will be followed by an actual decline. Both a stationary and a declining population would be new to this country, which has been geared to an expanding population, an expanding econ-

omy. But the shock, when it arrives, may not be too great, for the slowing down of the rate of growth is now easily perceptible and we may become accustomed to its effects before growth definitely stops.

We may also become accustomed to marked changes in the age distribution of the population. Some authorities predict that by 1980 the number of persons over 65 years of age will have doubled, while the number under 19 years of age will be halved by that time. Fortunately, the number in the age group 20–64 is not expected to alter very much. What does changing age distribution mean in terms of public health? According to Mr. George St. J. Perrott of the United States Public Health Service: "If we assume no progress in prevention and control, the various causes of ill health will assume different relative importance in years to come, some increasing and some decreasing. For example, by 1980 an increase of 76 per cent may be expected in the total days of disability due to the cardiovascular-renal diseases, 15 per cent in digestive diseases, 15 per cent in disability due to rheumatism and 22 per cent in accidents; on the other hand, disability due to the acute communicable diseases will decrease by 25 per cent even if no further progress is made toward their control."[1]

I must speak of still one more trend in population change. Corrected birth rates indicate that our urban populations, especially in the larger cities, are not reproducing at a sufficient rate to replace themselves, while rural rates of reproduction are far above the replacement level. In all regions of the country high rates of reproduction are associated with low planes of living. The greatest surplus of births comes from regions where public health and educational machinery is least developed. Has this fact anything to do with the medical findings of selective service boards?

Another influence brought to bear on the changing front of health is change in the leading causes of deaths and illness. Decreases[2] in the importance of leading causes of death between 1911 and 1929 are as follows: typhoid and paratyphoid fever, 92 per cent; malaria, 91 per cent; smallpox, 75 per cent; measles, 78 per cent; scarlet fever, 82 per cent; respiratory and acute disseminated forms of tuberculosis, 50 per cent; other forms of tuberculosis, 65 per cent; bronchitis and bronchopneumonia, 33 per cent; diarrhea

and enteritis, 83 per cent; cirrhosis of the liver, 38 per cent. Some of the increases are cancer and other malignant tumors, 47 per cent; diabetes mellitus, 44 per cent; diseases of the heart, 54 per cent; appendicitis and typhlitis, 43 per cent; homicide, 15 per cent; automobile accidents, 1,344 per cent.

Faced with these changes on the enemy front, it will be necessary drastically to revise the plan of attack if success is to be achieved. Expectation of life at different ages must be taken into consideration in connection with the changing age distribution in our population and the increase in mortality and morbidity from disease to which the adult is most prone. Comparing Massachusetts life tables of 1789 with those of 1929 reveals an enormous increase in expectancy of life at birth—from 35 years to over 60.[3] Marked increases in life expectancy have occurred only in the younger ages, however. As far as middle and old age is concerned, there has been no consistent increase and some decreases have occurred.

The growing liberality of man's conception of his duty towards his fellow man is exerting strong pressure on the public health front. This has been greatly influenced in recent months by the new methods of war and of defense. Sociologists have always recognized that extremes of poverty and affluence are apt to set up stresses and strains which may end by wrecking society. It remained for the German army to make use of this theory in the most practical way. The houses of the workers and of the poor were deliberately bombed, while for a time the dwellings of the upper classes were spared, and German propaganda made sure that the lesson would not be lost. But the poor stood up with unexpected courage and determination. It is said that attendance of workers in factories which are in danger of bombing is more faithful than in factories away from the front of danger.

This new kind of war seeks out every weakness in a society; it is no wonder that means should be sought for strengthening the weaker elements. Better housing, better medical care, and improved sanitation have been quickly followed by free or cheap milk in the schools and clinics, by more equal distribution of protective foods to all classes, by special provision of meals for workers in defense industries.*

* These remarks apply to Great Britain.

It is not a coincidence that evidence of the great disparity between sickness and death rates among different income classes has been accumulating rapidly in recent years. Among wage earners, the average number of days of disability from illness declines with increasing income; it is nearly nine days among workers earning less than $1,200 a year and not quite four among those who earn $3,000 or over.[4] The infant mortality rate in Denver, in 1930, was 160 among families earning less than $500, while among families earning $3,000 or over it was 30.[5] In Cleveland, in 1928, infant death rates were 88 in the poorer and 40 in the better residential districts.[6] My distinguished predecessor, the late Edgar Sydenstricker, summed up the evidence in these words:

> A definite inverse association between the amount of income and the incidence of sickness and death is clearly shown by a considerable body of evidence. If income or economic status were determined entirely by inherited constitutional strength, by innate vitality, then we should be limited to the conclusion that these differential rates of sickness and death were entirely due to these differences in heredity. But we know that heredity alone does not select which persons are to be in one economic class or another; although undoubtedly it plays a part; on the contrary economic status is itself determined largely by environment.

The development of new weapons of offense constitutes a major influence in determining the changing front of health. The use of sulfanilamide and its derivatives made possible a tremendous advance in the pneumonia sector; I understand that it is playing an important part in the eradication of trachoma. But new weapons are now being forged which will enable the whole front to advance all along the line on an unprecedented scale. These new weapons are being furnished by the developing science of nutrition; some of them have been used in an experimental way—on a small scale; the results have been astonishingly good. Let me cite two examples:

First Example.—A study has just been published in the *Journal of Nutrition*[7] bearing on the influence of prenatal diet on the mother and child. Two hundred and ten pregnant women in approximately the fourth month of pregnancy were selected on the basis of a study of their diets. These diets were very poor, being deficient in calories as well as in the more important specific nutrients. An

attempt was made to supplement the diet of every second one of these women so that it would be satisfactory by modern standards. To achieve this purpose these women received a daily supplement of one egg, one pint of milk, one orange, one ounce of cheese, four and a half ounces of tomato juice, half an ounce of wheat germ and some iron. Here then were two comparable groups of pregnant women; almost exactly comparable except that 90 of them received a satisfactory diet from the fourth month of pregnancy to the end of labor, and 120 of them continued to consume the poor diet they had been accustomed to using. In the poor diet group 6 per cent had miscarriages; 8 per cent, premature births; and 3.4 per cent stillbirths. In the supplemented group there were no miscarriages, no stillbirths, and only 2.2 per cent of premature births. This means that there were no deaths among the offspring of the 90 women whose diet had been supplemented, while there were 14 deaths among the offspring of the women who continued to receive the poor diet. Duration of labor, complications of pregnancy, psychological state of the mother, health of the offspring—all of these were so much better in the group of mothers whose diet had been supplemented that no one was left in doubt as to the part played in pregnancy by better nutrition.

Second Example.—Some time before the present war the British Army authorities were alarmed at the large percentage of would-be recruits who were rejected on medical examination. This was over 50 per cent in 1934, nearly 45 per cent in 1935, and nearly 60 per cent among those volunteering for the air force. Parenthetically, these percentages of rejections are not to be compared with rejections in our own selective service examinations, for the former were volunteers and only presumably fit men would volunteer, while the halt, the maim, and the blind must appear before the draft boards.

About a thousand of these rejectees in England were sent to a physical development depot at Canterbury, where they were given ample food (five meals a day), long hours of quiet sleep, hard physical work, and healthful recreation. At the end of about six months these men were asked if they still wanted to volunteer for the Army. Nearly all of them did, and they were sent to recruiting offices where they were not previously known. As a result of their conditioning at the Canterbury depot, 86 per cent of 834 young men (who had been rejected) were now accepted for army service and passed on to regimental depots.[8]

The whole new science of nutrition has developed during the last 35 or 40 years. We have not even begun to apply it. When we do

make a serious attempt to apply for human benefit this new knowledge of bodily chemistry, we shall be ushering in a new era of public health. I believe that the results will be just as important as the contributions made to the cause of public health by the discoveries of Pasteur and his associates.

Biochemists and physiologists have worked out the rôle of many of the vitamins and minerals in human metabolism. I learned in medical school that the body required for its functioning fats, carbohydrates, and proteins, plus a few accessory substances. The list of essential nutrients has now reached at least 37, consisting of 6 or more vitamins, 11 minerals, 18 amino-acids, a separate source of glucose and linoleic acid. Not only do we know that these nutrients are essential, but we know approximately in what amounts and proportions they must exist in a diet adequate for health. Hence there is general agreement, not only in this country but all over the world, wherever men have delved deeply into the science of nutrition, on the amounts of the different nutrients required for a satisfactory diet.

The first generally accepted statement of dietary requirements was prepared by twelve experts from different countries who came to Geneva in 1935 at the call of the League of Nations, and took only three days to reach full agreement.[9] But as the science of nutrition advances, these requirements need revision, and today the League is not in a position to convene committees at Geneva. So the task has been taken over by the Food and Nutrition Board of the National Research Council in Washington. By its standards, which are known as dietary allowances, a large proportion of the people in this country fail to obtain diets adequate for health. The greatest difficulty occurs among the lowest income groups which are also subject to the highest morbidity and mortality rates. As income rises more of the protective foods needed for health are purchased; as income declines, smaller and smaller amounts of these foods are obtained.

In any given income group there are families which buy wisely and others which buy foolishly; this is the field for education in diet. By these standards nearly 50 per cent of the population in Great Britain before the war did not have diets adequate for health. The diets of more than a third of our own people are

deficient by the yardstick of the Food and Nutrition Board of the National Research Council. Improvements in health to be expected by raising inadequate diets to a satisfactory level are illustrated by the results of giving extra milk to school children. Growth is accelerated, cheeks become redder, and spirits more boisterous in comparison to similar groups who do not receive the supplement.

The great problem as regards nutrition is to select out of the population those who are suffering mildly from nutritional deficiencies. It is not difficult to diagnose cases of gross deficiency; these are the easily recognizable scurvy, rickets, beriberi, xerophthalmia, nutritional edema, nutritional anemia, pellagra, etc. But for every fully developed case of one of these deficiency diseases there must be hundreds, yes, thousands, whose deficiency is so mild that it shows no readily recognizable symptoms. Little progress will be made in the conquest of malnutrition until we know exactly where, when, and to what extent it is prevailing.

In this as in every other public health problem precise definition is the first requirement. Little light is thrown on the existence of specific nutritional deficiencies in the mild or latent stage by the measures usually adopted to appraise nutrition—height, weight, and other anthropometric measurements. The tests must be more delicate and specific: chemical determinations of fasting blood levels of different nutrients, such as blood-plasma ascorbic acid; rapidity of excretion of test doses; tests of capillary fragility; best of all, observation with the naked eye or the biomicroscope of early pathologic changes caused by the deficiency. This is the method of detecting at an early stage the presence of riboflavin deficiency. Into the normally clear cornea minute vessels make their way. These at first may be seen only with the slit lamp. They begin to fade out in a few hours after large doses of riboflavin. The next stage is cloudiness: interstitial keratitis, which may go on to ulceration and opacity. There are other signs of early riboflavin deficiency: cheilosis, a characteristic glossitis, and certain skin lesions. But the keratitis is one of the earliest and most constant.

In the first report of the clinicians who described these signs of early deficiency in riboflavin, two cases of syphilitic interstitial keratitis were included. These resisted antisyphilitic treatment

but cleared up readily with riboflavin. I would like to remind this audience that many workers with laboratory animals have reported the development of cataracts among those animals on a diet deficient in riboflavin, or vitamin G, as it was first called.[10] The rôle of riboflavin deficiency in the development of cataracts has never been fully elucidated, and deserves further study now that the pure substance is so readily obtainable.

Fat-soluble vitamins have long been known to exert a strong influence on the eye. Bitot described characteristic spots in the conjunctiva in 1863, and many of the changes which we now know to be due to a deficiency of vitamin A were accurately observed and recorded even earlier. The slit lamp is of the greatest assistance in detecting the early changes which are thought to precede xerophthalmia, clearly recognized as a sequel to vitamin A deficiency. Large groups are now being subjected to careful study for evidences of riboflavin and vitamin A deficiency, and surprisingly large numbers have been found to show unmistakable signs of such deficiency. Dietary studies have consistently revealed that a great many of our people fail to receive in their diets the amounts of these nutrients which the best authorities consider necessary for health. The observation of large groups for vascular invasion of the cornea and for characteristic changes in the conjunctiva has fully corroborated the results of dietary studies.

In July, 1941, there appeared in the *American Journal of Diseases of Children* an account of 119 cases of follicular conjunctivitis in school children due to vitamin A deficiency.[11] In all cases the diet was deficient in vitamin A or carotene. Prompt improvement and recovery followed the administration of large doses of vitamin A, while in control groups practically no improvement occurred.

I have said nothing of the measurement of vitamin A deficiency by the various devices which have to do with dark adaptation. Night blindness is certainly related to deficiency of vitamin A, but this deficiency is not the only factor involved in the rate at which dark adaptation takes place. Now that so many air pilots are being trained, the subject deserves fuller consideration. Research is urgently needed to assign to the different factors involved its exact rôle in the production of night blindness.

Mutch and Richards, of Aberdeen, produced well-marked ker-

atoconus in rats on a vitamin A deficient diet.[12] In most cases the corneas regained their normal contours after the animals were given vitamin A for a few weeks. Theorizing on the basis of their results the authors point out: keratoconus in European countries is rare; myopia and myopic astigmatism are common; their production may be due to the same mechanism. I mention this work to emphasize the need for new research. The vast amount of new knowledge which we have acquired as a result of advances in the science of nutrition makes it necessary to re-examine our knowledge in every field of medicine. Nutrition may prove to be one of the keys needed to unlock some of the mysteries concerning eye diseases and conditions which long have baffled us. In a few short years light has been thrown by the new science on important and fairly common diseases of the cornea and conjunctiva; possibly it will help to increase our powers of control over myopia and myopic astigmatism.

The greatest influence which is being brought to bear on the public health front is this attempt to push back the frontiers of disease by measures or methods of detecting and correcting early deviations from vigorous health. The chief health problem is no longer the prevention of fully developed disease. Our task is to determine *why* so large a proportion of our people fail to develop and maintain the vigorous health characteristic of selected classes. Translating this task into the responsibilities which will be assumed in future by the National Society for the Prevention of Blindness, I can see your emphasis shifting more and more from prevention to conservation, as indeed it has been doing in the last few years. Conservation of vision in the modern sense of the term will call for talents and energies never needed in the simpler tasks of the past. If past performance is any guide to future accomplishment, I am sure that the National Society will enter upon its new tasks with every prospect of success.

References

1. Perrott, George St. J., and Holland, Dorothy F. "Population Trends and Problems of Public Health." *Milbank Memorial Fund Quarterly.* Vol. 18, No. 4, pp. 359–392. October, 1940.
2. Sydenstricker, Edgar. *Health and Environment.* New York: McGraw-Hill Book Company, Inc., 1933. p. 167.

3. *Ibid.*
4. Perrott, G. St. J. "The State of the Nation's Health." *The Annals of the American Academy of Political and Social Science.* Vol. 188, p. 141. November, 1936.
5. Gengenbach, F. P. "Infant and Maternal Mortality in Denver." *Journal of Pediatrics.* Vol. I, No. 6, p. 719. December, 1932.
6. Green, Howard Whipple. "Infant Mortality and Economic Status—Cleveland Five-City Area." Cleveland Health Council, 1919–1937.
7. Ebbs, J. H., Tisdall, F. F., and Scott, W. A. "The Influence of Prenatal Diet on the Mother and Child." *Journal of Nutrition.* Vol. 22, No. 5, p. 515. November 10, 1941.
8. Crawford, J. A. "The Work at the Recruits' Physical Development Depot, Canterbury. The Undersized Recruit." *Journal of the Royal Army Medical Corps.* Vol. 73, pp. 1–39. 1939.
9. League of Nations. *Final Report of Mixed Committee on Problem of Nutrition.* Series of League of Nations Publication, Official Number A13, 1937.
10. Day, Paul L. "Vitamin G Deficiency." *American Journal of Public Health.* Vol. 24, No. 6, p. 603. June, 1934.
11. Sandels, Margaret R., Cate, Helen D., Wilkinson, Kathleen P., and Graves, L. J. "Follicular Conjunctivitis in School Children as an Expression of Vitamin A Deficiency." *American Journal of Diseases of Children.* Vol. 62, No. 1, pp. 101–114. July, 1941.
12. Mutch, J. R., and Richards, M. B. "Keratoconus Experimentally Produced in the Rat by Vitamin A Deficiency." *British Journal of Ophthalmology.* Vol. 23, pp. 381–387. 1939. (Rowett Research Institute, Aberdeen.) *Nutrition Abstracts and Reviews.* Vol. 9, No. 3, p. 566. January, 1940.

Eye Defects Discovered Through Selective Service Examinations*

Arno E. Town, M.D.

A PROGRAM of eye health is vital in the schools, in industry, and in adult groups in order to achieve the utmost in national defense, summarizes Dr. Town in analyzing the eye defects discovered through selective service examinations.

THE examination of selectees under the Selective Service Act should provide us with a source for comprehensive studies of our physical defects as a nation, especially in comparison with the defects found in men drafted in 1917–18. Only partial statistics on the recent selectees are available at present, so that no final conclusions can be drawn, but the figures are sufficient to give us a working idea of the completed picture.

From the experience of colleagues and myself working on the Selective Service Boards, eye defects, many of them remedial, are impeding national defense. Recently, Surgeon General Thomas Parran, of the United States Public Health Service, termed it a national disgrace that a large per cent of men otherwise available for service were deferred because of physical defects.

Dr. Roger I. Lee, President of the American College of Physicians, said that certain physical regulations for trainees were "too rigid" and that the large number of deferments for physical defects was no cause for alarm over the health of the country's man power. He continued: "The greatest per cent of physical deferments in Selective Service has been made so far for defective teeth and defective eyesight, regulations for which and the interpretation thereof by draft boards have been over-rigid." He also recently

* Presented at the National Conference of Social Work, June 5, 1941.

declared there has been over-emphasis on the relation of draft medical statistics to the general health of the nation.

The requirements of eyesight by the army and navy are necessarily rigid and many men are kept out of the service who would be valuable and willing soldiers. Comparisons between the current draft statistics and those of the last war are bound to be erroneous because the standards of physical and mental selection are much more rigid today. Furthermore, our present-day methods of diagnosis are superior and the government is seeking to bar potential as well as obvious misfits from the army now in training.

Many physicians believe that some of the reasons for deferment are inconsequential from the practical viewpoint and that men are being rejected who could prove useful in occupations requiring limited physical activity. This is, of course, for the army to decide, but it is safe to say that many of those refused as physically unfit are reasonably healthy by ordinary civilian standards and capable of fulfilling the social and economic demands of normal life.

There has, it is true, been a substantial per cent of rejections because of physical deficiencies which cannot be dismissed as unimportant, and regardless of the efficacy of a health program, it could not banish many congenital deformities and traumatic defects for which reparative procedures have not yet been devised.

A summary of defects among men drafted in the World War of 1917–18, as issued by the U. S. Public Health Service recently, indicated that 21 per cent of the men examined were rejected for any military service and an additional 10 per cent were accepted for limited service only. Corresponding figures for men examined under the Selective Service Act of 1940, indicate that 28 per cent were not qualified for any military service and an additional 15 per cent were qualified for limited service only.* The two sets of figures are only roughly comparable, since there is a difference in the age groups and occasional differences in the definitions of defects. Moreover, it is certain that medical examinations as of 1940 were more exacting.

In the order of their prevalence in the figures for 1940, defects of teeth head the list, 8.32 per cent of the total number examined

* Later analyses of larger numbers show even higher proportions of rejections. This is also true of rejections for eye defects.

being disqualified for full general military service for this cause. It was amazing to find how many young men failed to come up to the minimum requirements and how many had never before had a physical examination. An indirect service was done for them when the poor oral hygiene was called to their attention, and many expressed surprise and desire for corrective measures.

The next largest group was the group who failed to meet the requirements in vision (5.03 per cent did not qualify for general military service, about half of whom were not qualified for any military service whatever). This compares with 5.3 per cent not qualified for general military service among drafted men in 1917–18. In the latter group were many (4 per cent of the total examined) specified merely as having "defective vision," which probably indicates that these defects are to be accounted for by refractive errors. In our own experience with the examination of the present selectees, we found that many of these young men who could not see well enough to become soldiers did not wear glasses. Practically all of them had been driving motor vehicles and many could not be made to understand why they should be rejected as they possessed operators' permits to drive.

Included in the above figures are only those individuals whose dental or eye defects were the primary cause of their disqualification as selectees. In the U. S. Public Health Report summarizing the findings for the 120,689 men in the 1940 group, no figures are available indicating the total prevalence of each type of defect. However, a more detailed study of a group of men examined in New York City (comprising 17,540 men) showed that the entire group of those having eye defects sufficient to disqualify for general military service amounted to 11 per cent of the total examined. The latter figure probably gives a truer picture of the prevalence of uncorrected vision defects in young adult males.

Rejections for insufficient teeth, defective eyesight, and underweight are greatly to be deplored because in many cases the disqualifying fault could have been prevented by public education. More stress on proper nutrition, hygienic use of the eyes and other organs, also, early recourse to medical and dental aid, would do much to improve the general level of health. Selective Service examinations show differences in health in different parts of the

country, a notable example being the poor dental conditions in the New England states as against the good ones on the Pacific Coast. The percentage of rejections in the Dust Bowl as well as in the Goitre Belt is abnormally high, again showing the importance of the nutritional factor.

If, after the draft in 1917–18, a program of sight saving had been instituted, how many more of our young men of today would have been accepted for military training and would have been more fit for the battle of life! The draftees of today were the children of 1918. It behooves us all to set our will and energies to work upon a national campaign for sight conservation.

The most common causes of eye defects discovered by the Selective Service examinations in most states are myopia and myopic astigmatism, and until the cause and prevention of these defects can be determined, the eyes of our youth will be a problem of national defense.* There are several theories as to the causes of myopia: hereditary, nutritional, and unhygienic conditions. Observers in England are commenting on the decrease in the number of pupils with myopia which has been noticed in the last twenty years in the sight-saving classes, formerly called myope classes. This is being attributed to the marked rise in the standard of living in the lower income group. Here, then, is tangible evidence of the nutritional theory of myopia, and in the field of nutrition and hygiene the medical social worker can do great good.

The role that vitamins play in the prevention of refractive errors has not yet been determined, but with our increased knowledge of these dietary aids, we may find a valuable means of increasing our eye health. However, until more is known about vitamins, the public should be warned against their indiscriminate use. The further we go into the field of preventive medicine, the more we realize how much is yet to be done.

Another common preventable defect which has been brought to the attention of those working on the Selective Service Boards is the poor vision in one eye due to squint or cross-eyes. Many of these men have been surgically treated so that the appearance of the eyes is fine, but there has been no after-care or eye exercises,

* In a few states trachoma may still be the most common cause because of lack of treatment facilities for white patients. Detailed reports are not yet available.

which might have prevented the defective vision. Because of this fact, I have seen men rejected from mechanical trades, where their lack of judgment of depth perception is a definite handicap. Here then is an entire field of sight conservation which has been neglected. A follow-up of these case reports should be the endeavor of the social worker, working in association with the surgeon who operated on the cross-eyes. The occurrence of an ensuing amblyopia or loss of vision could be prevented by the organization of an orthoptic, or eye-exercise, clinic. There is a lack of continuity in medical care which should be corrected. We need co-ordinated services which will unite the medical profession and all of the social agencies.

Another cause of rejection is opacities or scars of the cornea of the eye due to previous ulcers. It is now an established medical fact that lack of the vitamin riboflavin (part of the B complex) predisposes to corneal disease and ulcers, resulting in considerable loss of vision. This brings up the question of whether we are doing all we can in the way of prevention of disease, as unquestionably a certain number of these eyes might be saved if they had the proper medical care in conjunction with the correct nutritional factors. In these cases, where general environment is of such value, the cooperation of the medical social worker is essential.

To those who have studied available data on the etiologic factors in the serious affections of the eyes which too often lead to blindness, the figures showing the prevalence among selectees of defects other than eye defects are significant. Defective teeth and diseases of the ear, nose and throat may indicate a possible source of focal infection which, if neglected, would seriously damage the eyes. Certain general systemic diseases, such as cardiovascular disturbances, are likewise important as a possible source of future eye disease. The early discovery and treatment of venereal diseases among this group are also to be commended as prevention of blindness measures.

What should have been done before the huge screening test of the nation's health, constituted by the Selective Service Act, went into effect? What should be done now that we have the information in regard to the defects in the physical condition of our young men? Since 43 per cent of the young men in the country are being dis-

qualified for general military service, it shows that we must do a better job of improving the health of the people.

What is necessary, primarily, are methods of conservation of vision. A program of eye health education is vital in the schools, in industry, in adult groups. Better lighting conditions and safety measures in all industries are essential. Safety campaigns should stress the preventability of eye injuries. The medical profession should continue to seek earnestly a scientific answer to problems of defective vision, eye diseases, and their causes. An improvement in national health will be the greatest contribution to result from this whole defense effort.

The National Society for the Prevention of Blindness has long had a program of adult education in regard to the care of the eyes. Its objectives have been to ascertain, through study and investigation any causes, whether direct or indirect, which may result in blindness or impairment of vision, to advocate measures which would lead to the elimination of such causes, and to disseminate knowledge concerning all matters pertaining to the care and use of the eyes. These objectives have been constantly and seriously followed. Lectures, radio broadcasts, and literature have reached many thousands. The Society is ceaselessly acquainting the public with scientific knowledge relating to cataract, glaucoma, trachoma, myopia, strabismus, hereditary eye conditions, etc. It advocates measures but has no facilities for enforcing them; it influences other agencies to carry on the necessary activities.

Today much is being done in the schools toward maintaining the general health of the pupil. In an ideal program, periodic check-ups are made, and if any disease or impairment in his condition is noted, he is referred to the proper physician for treatment. If the parents are unable to supply the means for such treatment, charitable societies in most communities are glad to offer their help. An intensification of this program in the schools is needed, together with a schedule of eye health studies.

If the physical defects are taken care of early, we could avoid major and minor diseases. There is much we could do to improve the general health of the country, but we can't impose these things upon the people. They must come voluntarily and seek to improve their health. Col. Leonard Rowntree, Chief, Medical Division,

National Selective Service Headquarters, stated that Selective Service is holding a mirror before the public and giving the facts and indicating the need; on this basis should be built a new public health for the nation.

References

Britten, Rollo H., and Perrott, George St. J. "Summary of Physical Findings on Men Drafted in the World War." *Public Health Reports.* Vol. 56, No. 2. January 10, 1941.

"Causes of Physical Disqualification under the Selective Service Law. Early Indications." *Public Health Reports.* Vol. 56, No. 19. May 9, 1941.

Kopetzky, Col. Samuel J. "New York Induction Boards Pass 76 Per Cent for Military Service." *Journal of the American Medical Association.* Vol. 116, No. 12. March 22, 1941.

Selective Service Regulations. "Standards of Physical Examination During Mobilization." *Physical Standards.* Vol. 6. Washington: U. S. Government Printing Office, 1940.

Saving Sight in the Young Adult Through Social Service*

Mrs. Ophelia Settle Egypt

MRS. EGYPT indicates how the various social services contribute to the solution of the general problem of conservation of sight.

EYE defects rank second as a primary cause of rejection of draftees under the Selective Service Act. Dr. Town aptly asks: "What should have been done before this huge screening test of the nation's health went into effect? What should be done now that we have the information in regard to the defects in the physical condition of our young men?"

In spite of the excellent work of societies for prevention of blindness and the increased activities of the federal government and of some state and city health units, certain gaps in our program for conservation of maximum eye health still exist. This paper is an attempt to explore the possible answers to Dr. Town's questions and to look at the gaps in the programs from the viewpoint of the medical social worker.

What lacks in community agencies are responsible for the fact that approximately 28 per cent of the draftees so far examined were rejected for service? (Later analyses of larger numbers show even higher proportions of rejections. This is also true of rejections for eye defects.) What can the medical social worker do about these gaps in community standards and practices? What of the 11 per cent rejected because of visual handicaps and of the eye health of their children, who will be the young adults twenty years hence?

The Story of John Selectee

The following story of a young man who will soon become one of the group of selectees marked "rejected because of visual defect"

* Presented at the National Conference of Social Work, June 5, 1941.

gives some idea of the picture of the individuals and the communities behind the figures.

John, who will be 21 years old in August, 1941, was referred by the medical social worker in an eye, ear, and throat hospital to a private family agency, which had a special division for service to the blind. The diagnoses were detached retina in the right eye and chorioretinitis in the other. John had been under treatment on the ward for two months. The doctors think that marked loss of vision in one eye probably occurred six or seven years ago, but John apparently did not realize this. The results of treatment had not been as good as expected and the doctor said that the prognosis was poor, that any slight shock or physical movement might complete detachment. John was to be prepared for total blindness. He was referred to the family agency because he had expressed concern about having to return either to a home in which he felt unwanted by his stepfather, or to a married sister who was financially unable to keep him. When the family social worker visited the ward two days later, as agreed, she found that John had been discharged (on the same day that referral was made) without the knowledge of the medical social worker and the record did not indicate the address to which he had been sent. The doctor explained that since John was so restless and prognosis was so poor, a day or two less on the ward could make little if any difference to his eyes.

John was a typical white American boy, loving sports and general outdoor activities. He liked to read adventure stories. He had had difficulty holding jobs but his stepfather said this was because he was lazy, and even his mother thought it "funny that all his jobs petered out so soon." He had enlisted in the National Guard in October, 1939, and a report from this source gave vision as "20/20 in each eye. Eye conditions normal." In January, 1941, he came home beaming because he had secured a job in the delivery department of a large store. At this time he asked his mother to give him money for glasses. When John reported for work, he made so many mistakes in handling the delivery slips that his foreman referred him to the nearest optometrist, who recognized the seriousness of the eye difficulty and sent the boy to the eye clinic as an emergency case.

Through interviews with John and his mother, the social worker was able to obtain the following significant history: John began school in a southern state at the age of seven. He progressed normally through the fourth grade, but repeated fifth grade five times! He finally left school at the age of sixteen. As social workers, our first thought would be, what happened to John after

he entered the fifth grade? The mother finally remembered that John's father died about this time and that John and his father had been great pals and often went on fishing and hunting trips together. Pressed further, she recalled that on one of these trips shortly before the father's death, the powder from the shell in John's gun "fired back in his face." She thought that some of the powder got into his eyes and she recalled that he did complain of his eyes hurting for a few days afterward, but no doctor was consulted. She recalled John's recent request for glasses and regretted that she had failed to get them for him. She could have secured the money from the stepfather, who was financially able to provide adequately for her and John, and who even helped John's married sister occasionally.

In discussing his failure to progress further in school, John admitted that he had some difficulty. "Sometimes I would read a lot and get a headache, or the words would be blurred on the page and then I'd throw the book down and go out and play ball. Even when I read the stuff, I couldn't seem to remember it. . . . At the time, it never occurred to me that there was anything the matter with my eyes. . . ."

Here then is an active, popular boy, accustomed to economic security, who because of a single physical defect is unable to participate in the national defense program. John is now destined to complete blindness in early manhood, blindness that in all probability could have been prevented.

Gaps in Community Resources

The factors that have led to the serious eye difficulty in this case are probably typical of what has happened in the cases of many of our rejected draftees.

The first factor is that John was not aware of his eye trouble until, after various failures to hold jobs, he realized that he could not even see to do a particular job that called for ordinarily good eyesight. His mother, his friends, his former employers and teachers had all failed to think of eye difficulty as a causative factor in the problems presented by this boy. In other words, lack of knowledge of eye symptoms on the part of the general community is one of the gaps that must be bridged if unnecessary blindness is to be prevented.

A second gap shown in this case is lack of periodic eye examinations of preschool children, and of all school children. This implies

also the need for adequate provisions for special educational facilities and vocational training for the partially seeing.

A third danger shown is that of the casual examination, whether by expert or non-expert, and this brings up the importance of knowing where to go or where to refer patients with eye difficulties.

A fourth evident lack in this case is the failure of industry to provide facilities for examination and protection of the eyes of its employees. This includes accident prevention, since so many eye injuries result daily from this source.

A fifth gap occurs in the failure of the communities to provide adequate facilities for medical care and social skills to insure the application of modern scientific knowledge to all kinds of patients.

Turning to a discussion of the specific gaps mentioned above, what can the social worker do to make the nation conscious of symptoms that indicate the need for an eye examination? In the first place she must remember that prevention of blindness in the young adult means also prevention of blindness in the young child. She can begin by learning and then spreading information about eye symptoms through all groups. Non-medical social workers and public health nurses could do a great deal in this area if they became aware of the importance of listening intelligently to client's remarks about their own and their children's physical condition. When they register complaints of headaches after reading; of a child having difficulty in school; of one child who wants only to play and never to study; and of another who reads with his book close to his face and who has to be forced to go outside and play with the other children—all these are indications for further questioning and for referral to a competent ophthalmologist for examination. Just by using their eyes, the social worker and nurse can often observe in their client-group symptoms suggesting need for eye examination when neither parent nor child is conscious of such symptoms.

Teachers in all schools, public and private, from kindergarten through college, form another large group needing education along this line. They get the children who are forced to use their eyes for close work, and often this is done in poorly lighted rooms with too little light or too much glare. These teachers have an excellent opportunity to notice the general behavior of millions

of children and young adults and to refer them for examination. Most of them would be interested if they were only made conscious of the importance of the rôle they can play in conservation of sight. Suppose John's teacher had stopped to try to find out why he failed the fifth grade the first time. Suppose she had asked him if he had headaches or any other difficulty when reading. Had she been conscious of the meaning of symptoms and referred him immediately for adequate medical care, John might be acceptable for the draft when he is called up in August. Not only that, but he might have been able to hold a job and to have become an independent, happy and useful citizen of a peaceful America! If only John's teacher had used the National Society's list of observable behaviors suggesting visual disturbances! Parent-Teacher Associations' programs are useful means of reaching both kinds of responsible people close to young children. Certainly parents constitute the largest group needing information regarding the meaning of symptoms.

Numerous civic groups also can be reached through the press and through platform and radio talks. Societies for prevention of blindness are making progress, but medical social workers outside these societies also have the responsibility of making their communities "eye-symptom conscious" if they are to save sight in the young adult.

In John's case, knowledge of the meaning of symptoms alone would not have prevented eventual blindness. It would also have been necessary to know where to obtain a thorough eye examination instead of a casual one, the second danger shown.

Even if John's parents and teachers knew nothing of the meaning of symptoms, yearly eye examinations of the preschool and school children by a skilled ophthalmologist would have picked up whatever eye difficulties John had at that time. John told the social worker—"Down there they didn't have doctors in the schools like they do up here to check on the kids." Since John suddenly failed the fifth grade five times, he probably needed the special educational methods used in sight-saving classes to enable partially seeing children to profit by the free education considered an essential part of the democratic way of life. In the ideal community, vocational guidance and training would have been available as he grew

up. Such educational and vocational services are equally necessary to all social and economic groups, regardless of religion or race.

An example both of complacency and of the shortsighted business method involved in neglecting to cover all groups in a social program can be cited in a southern city where there are six sight-saving classes for white children in the grammar schools and one in the high school. The Negro elementary school population is about 20,000, but no provision for sight-saving classes for them has been made. The same is true of practically all rural children and the children in most of the smaller cities in this state. Granted that it is a step forward to provide for one group of children, it is even better economy to provide for all children in every community.

The southern states are not the only backward areas in the country. Even in the nation's capital, sight-saving classes and teachers for the Negro children are woefully inadequate, and this statement is generally true of provisions for all children, Negro and white, in the small town and rural area of the entire country. The country must be awakened to the necessity of closing such gaps if the eye health of the young adult is to be protected. Think also of the taxes the community of which John is now a resident might have saved; for now it will have to care for this blind youth for a possible forty or fifty years. Suppose John lives forty years longer, that is, to the age of 61, and during that period receives the maximum blind grant of $40.00 per month (which is certainly a small enough amount for a single person for all expenses), the community will have spent on this one individual almost $20,000! This does not count the cost in suffering and frustration to John or the cost of administering the grant, and the cost of medical and social services; nor does it count the cost to industry and to the defense program in being deprived of this man's working power. Suppose John's state had spent this same amount of money for the services of an ophthalmologist and a medical social worker trained in eye work—not one child but thousands of school children would have benefited.

The third danger mentioned earlier in this discussion is the varying quality of medical examinations and the problems growing out of the false security engendered by casual examinations. John was examined when he volunteered for the National Guard in October,

1939, and his eyes were reported normal. Not knowing how or by whom this examination was done, or whether inflammation of the choroid and retina in the first eye resulted from the accident in John's childhood, it is only possible to question whether the examination in this particular case was a casual one or was not done by an expert person. However, the history given suggests that a careful examination by a competent ophthalmologist at the time he volunteered would have revealed some eye pathology two years ago. Whether or not the difficulty in this case began after the eye examination in 1939, the fact remains that the public needs education regarding persons from whom competent eye examinations can be secured. It is also true that a casual eye examination by a physician is just as dangerous as a casual examination by an untrained person. In 1941, John was sent to an optometrist who knew enough to recognize the need for immediate attention by an ophthalmologist. Unfortunately, he reached even the optometrist too late. John is no exception: many otherwise well-informed people often do not know where to go when their eyes trouble them.

It will be remembered that John as a small boy had an eye accident while hunting with his father. He complained of his eyes for a few days and received no medical attention. Thousands of accidents happen daily in the street and in the home as well as on the job. Safety programs and campaigns are helping to reduce hazards but not nearly enough is being done. The average child and adult must get the psychology of safety into their beings; they must learn that it is smart to take time to be careful and to go to the doctor for a thorough examination of the eye following even the slightest eye accident.

The fourth danger revealed in this case is the failure of industry to examine John's eyes before employing him. This caused waste to the employer, as well as further delay to John in obtaining care. Dr. Hedwig Kuhn said: "Perhaps the most dangerous person in today's complex economic setup is the unconscious saboteur. His number is legion. His lack of visual co-ordination makes of him an unwitting, and usually totally unconscious, so-called 'Fifth Columnist.'" The employer who fails to provide pre-employment eye testing and the services that will prevent the making of this kind of fifth columnist is a great danger to the nation's safety.

The Medical Social Worker and a Rounded Program

As pointed out by Miss Baker: "The medical social worker is concerned not only with the need of the individual patient under treatment, but also with the resources of the medical institution and the community." We have talked about many of the resources lacking in communities and the medical social worker's responsibility for making the community aware of these gaps. The final discussion centers around the gaps in the medical and medical social services in programs for sight conservation in the average community and the medical social worker's rôle in reducing them. In any such discussion, emphasis must be placed on the fact that a sound program for the promotion of general good health is basic in any program for eye health. The best facilities in the world will be of little use if the population is not educated to the point where it recognizes the need for them for its own health and protection.

The medical social worker, then, must not only agitate for adequate medical resources: she must also help to educate the community in the use of these resources. Stimulated by the Federal Government, many states and cities have remarkably improved in both the provision for these resources and the education of the community in the use of them, but there is no community which can boast that it has nothing left to do in this area. A few examples of the gaps in the area of communicable disease control will be given. The lack in medical care for the newborn child is appalling even in larger cities with sufficient legal provision for such care. For example, one local society for prevention of blindness recently made a study of the status of ophthalmia neonatorum. In spite of legislation requiring the use of silver nitrate, one hospital with over 4,000 births during the period studied used argyrol as the prophylactic. This hospital had the unusually high rate of one case of ophthalmia neonatorum per 25.70 births, or 39 cases per 1,000 births. Following the discovery of the above facts, the health officer called the attention of physicians and hospitals to the existing legislation, and at present all are complying with the law.

This study again raises the question of the medical social worker's responsibility for keeping up with the newer methods of treatment of eye diseases and seeing that the patients get the benefit of this knowledge. One step here is seeing that general social workers

know about these new methods of treatment. It was found in 1940 that in Oklahoma, where trachoma is common among white people, general agency social workers were not aware that sulfanilamide was controlling trachoma in Indian children in their own state. The Indian Service was complaining that their work was handicapped because the Indian children were constantly being reinfected by untreated white children.

Although programs for the control of venereal diseases have been given great prominence of recent years and are decidedly a part of any plan for conservation of vision, there is still much to be done. The social worker can check her own community's venereal disease control program with that in the most progressive communities, and use all the facts and figures she can find to awaken the community to the need for further progress and saving of human and financial resources by providing for a health program that will make it as difficult for a doctor to find a case of venereal disease for demonstration purposes as it now is to find a case of typhoid in our more advanced cities.

There is some disagreement among doctors as to the degree that eye health can be affected by malnutrition, but most of them would admit that it plays an important rôle. Many would also agree that infected teeth are often partially due to poor nutrition and that such teeth form a possible source of focal infection. If this is true, then the fact that failure to meet the dental requirements ranks first as a cause of rejection of draftees is also significant from the point of eye health. Recently the National Dental Hygiene Association was organized by laymen for the purpose of education regarding the need of dental care.

Better nutrition for the entire population might have saved teeth as well as eyes, and some authorities even believe that there is some causal connection between malnutrition and myopia, the eye defect which Dr. Town found one of the most common eye causes for rejection of draftees. Faulty nutrition, like eye disease and defect, is found not only in the lower economic levels, but in all economic and educational classes of society. It is therefore necessary to begin the program for preservation of the sight of young adults with education of the pregnant mother as to the dietary essentials and regular dental care for herself and child. It is tragic

that many private doctors not only fail to discuss this matter with patients in the upper intellectual and economic circles, but do not even make blood tests of pregnant women.

One of the newer types of treatment resources found in only a few communities is the orthoptic clinic, where a skillful technician under the supervision of the ophthalmologist teaches the patients how to improve vision. So many questionable practitioners have advocated exercises for strengthening eyes that the genuinely careful work of the few people with enough patience to work carefully and scientifically has been criticized. As time and the accumulation of skill and knowledge in this area show how many children with imperfect vision can be improved, this form of treatment, which is not a panacea, will be available to more and more of the patients who really need it.

Another part of an eye health program which has been questioned because of the exaggerated claims of some enthusiasts is lighting. The adequately lighted home, school, office, or industrial plant is unfortunately unusual, and yet we know that improper lighting aggravates eyestrain. Experts can now tell us how to equip a building for proper lighting and there is no excuse for the amazing lag in this area.

Emphasis has been placed on the responsibility of the medical social worker to help activate and improve the community resources for prevention of blindness, working with other professions to this end. It is not to be inferred, however, that she is to neglect her most important job of providing case work services to individual patients with the visual handicaps.

The medical social worker seeks to see the person with the disease and learn his individual feelings and ideas about his particular handicap. She knows that each patient reacts individually to his disease and to each step in its treatment. She knows also that her job is an integral part of medicine itself, and physicians are becoming more generally aware of the need for medical social workers in any medical institution attempting to help the sick or handicapped person. However, hospital administrators are slow to recognize the necessity of having a worker specially trained in the understanding of the diseases and defects of the eye. Some ophthalmologists are recognizing the contribution the social worker,

as a necessary member of the medical team, can make to the patient; others have been slow to utilize this kind of skilled personnel.

If a better showing is to be made twenty years hence, the program of prevention must cover the entire population. The medical social worker's responsibility is twofold: first, that of providing adequate social case work services for the visually handicapped; and second, awakening the general public to the gaps in the programs for conservation of vision, thus stimulating within the communities the desire to eliminate these gaps.

It is a strange paradox that general interest in conservation of health should receive its impetus from wars, which take so great a toll of human life. When we begin to select men to die for our country, we are startled at their lack of physical fitness for this great task. We must become as genuinely concerned in conserving the health of all the people so that they may be fit to live abundantly and enjoy the maximum benefit from living in a truly democratic society.

References

Baker, Edith. "The Place of the Medical Social Worker in Ophthalmological Services." *Sight-Saving Review.* Vol. X, No. 2. June, 1940.

Kuhn, Hedwig S., M.D. "A New Concept of Visual Performance in Industry." *Sight-Saving Review.* Vol. X, No. 4. December, 1940.

National Society for the Prevention of Blindness. "Eye Inspection and Vision Testing." (Mimeographed.)

Town, Arno E., M.D. "Eye Defects Found Through Selective Service Examinations." *Sight-Saving Review.* Vol. XI, No. 4. December, 1941.

Consultation services of the staff of the District of Columbia Society for Prevention of Blindness.

Prenatal Factors as Causes of Blindness

Leona Baumgartner, M.D.

DR. BAUMGARTNER presents herewith a discussion of the prevalence of blindness associated with pregnancy and birth; the factors of hemorrhage at birth and prenatal nutrition; the problems of ophthalmia neonatorum and prenatal syphilis; and how all these affect the eyes of the newborn.

HE WHO accepts the responsibility of discussing this topic is soon unhappy, for he finds himself in the precarious position of being judged either an ignorant fool or a blind egotist to imagine that he can do so effectively, for there are so few facts to guide him, and it is axiomatic in this scientific age that prevention is accomplished only when the problem is thoroughly analyzed, when causes are recognized, and when there is sufficient knowledge to point the way to specific means of prevention. The prenatal factors which cause blindness are not well recognized. A few specific methods of attacking the problem are known, but even if these were to be effectively used (which they are not) we would hardly scratch the surface. Even the boundaries of the problem are ill defined. Who are the people about whom we are talking? Where are they? Why are they blind? Could their blindness have been prevented? Isolated stories of persons without sight at birth have stirred the hearts of humanity since time immemorial, but such tales help little if we are to attack the problem of preventing these disasters in the future.

Prevalence of Blindness Associated with Pregnancy and Birth

From two sources one seems to get a picture of the extent of this problem of prenatal factors as causes of blindness in the United States of today. The first comes from the reports of the Committee on Statistics of the Blind of the National Society for Prevention of

Blindness and the American Foundation for the Blind. The most recent is a study of 3,868 children enrolled in schools for the blind in the United States in 1938–9.[1] It is estimated that two-thirds of the children in all such schools are included. About 90 per cent are under twenty years of age. Blindness in infants is difficult to recognize, so that it is reasonable to assume that most of those discovered blind by the age of one may well be blind because of some condition present near the time of birth. The statistics showed that two-thirds of the children now in schools for the blind were blind at or near birth. One concludes tentatively, therefore, that the prevention of blindness must necessarily concern itself actively with the problems of prevention of those causes of blindness associated with pregnancy and delivery.*

That little progress has been made in this direction may be inferred if one compares these 1939 figures in the United States with those from one of the few other studies available—those for children in similar schools in Denmark from 1898 to 1921.[2] Then only one-third of the children were reported blind before one year of age. Does this mean that the number of those blind because of other causes has been reduced, leaving a larger percentage today attributable to prenatal factors? When we remember the excellent services rendered to pregnant mothers in Denmark—services which have long been the envy of the rest of the world—we ask if this program can have made the difference? Perhaps, but the data upon which both of these studies are made are limited and it is obvious that comparisons of this kind are often dangerous. Nevertheless, one is left with the impression that a large percentage of children in schools for the blind are there because of something that happened to their sight before or near the time of birth.

Is this an important factor in the total picture of blindness in the United States today? Only last week a report appeared which gives us at least a hint. This is the study of prevalence of blindness as recorded in National Health Surveys conducted in 1935–6.[3] This, you will remember, was a house-to-house canvass of families in several parts of our country. The data collected are subject to

* Little attempt will be made in this paper to separate those causes of blindness associated with pregnancy and acting before labor and those acting at or near the time of labor, inasmuch as effective programs for prevention will necessarily deal with birth problems.

many criticisms. However, the extent of the survey makes its findings useful, and in its reports is often found information not available elsewhere. Obviously, in such a house-to-house canvass, most of the institutionalized cases of blindness were excluded. A person was called blind if the lay informant considered the vision impaired to a degree which he considered "blindness." Almost 2,500,000 persons were studied. In contrast to the school studies noted above, about 88 per cent were over 25 years of age; 409 out of each 100,000 were blind in one or both eyes, and 5 per cent of these were blind before 15 years of age.* There was a marked increase in prevalence of blindness with increasing age as a result largely of subsequent disease and accident. Thus, in the total picture, blindness associated with birth may seem not as important a factor as previously indicated. However, when one considers the fact that the high prevalence of blindness due to other factors occurs later in life when the serious problems of education, economic support, and institutional care are not so urgent, one realizes the importance of those cases in which blindness is present from infancy on.

Additional evidence of the importance of prenatal factors in causing blindness is secured if one scans the studies which have just been discussed from the point of view of the alleged cause of the blindness. In the 1938–9 school study[1] 49 per cent were attributed to prenatal causes, with an additional 5 per cent due to prenatal syphilis and an additional 9 per cent due to ophthalmia neonatorum, making a total of 63 per cent, again leading to the conclusion that two-thirds of the problem of blindness in these children is due to factors associated with pregnancy and birth.

In individual schools this problem has in some instances been studied more intensively. Thus, since 1934, members of the ophthalmological faculty at the Indiana University School of Medicine have examined children at the state school for the blind.[4] The group is small, 187, but the medical reports probably are more accurate than many others in the literature. Here, in 44 per cent, the etiological cause is stated as congenital, with an additional 12 per cent due to prenatal syphilis and 15 per cent (14.9) to ophthalmia

* Since the blind of school age are usually in state residential schools (that is, institutionalized), the proportion of the blind under 15 years of age may be underestimated in this survey.

neonatorum, a total of 71.2 per cent of all blindness in this modern institution definitely associated with pregnancy. The diagnoses most commonly found were optic atrophy (34.2 per cent), cataract (18.7 per cent), and ulcerative keratitis (16 per cent).

In the National Health Survey[3] certain broad cause groups were laid down and 5.5 per cent of blindness in one or both eyes was put in a category labeled "congenital and early infancy."

Let us look further into this question of etiology. Five per cent of children in schools for the blind were there because of prenatal syphilis; in one institution the figure was 12 per cent.[4] This is an entirely preventable condition. Today laws in 26 states require a test for syphilis to be taken during pregnancy; but if, as is well recognized, the majority of women do not present themselves for prenatal care until after the seventh month of pregnancy, we may still have congenital lues. However, we shall hardly expect these infections to be as numerous or as severe as in the days before such laws were initiated. In an intelligent program for prevention of blindness every state will have such laws as well as programs to insure adequate treatment of those infected, and an active campaign to teach the public the need of protecting itself. This is one cause of blindness associated with pregnancy which *can* be eradicated. Progress we have made, but it is hardly enough to be on the right road if we are not moving along it.

The second cause which one wonders that it is still necessary to talk about is ophthalmia neonatorum. In 1884, Carl Credé, that illustrious professor of obstetrics and gynecology in Leipzig, announced that gonorrheal conjunctivitis of the newborn could be prevented by the simple instillation of silver nitrate into the eyes. Any layman could do it and silver nitrate has always been cheap. Yet half a century later the schools for the blind in this country still care for children whose eyes were and are being neglected. Today, with chemotherapy, with sulfonamide drugs effective in treatment of these cases, the prolonged periods of care have been shortened and nursing problems simplified. Let us hope that this cause of blindness soon disappears from lists of causes as completely as smallpox, formerly an important item on such lists.

But what of the other 47 per cent which were gathered under the head of prenatal origin?[1] In 2 per cent the hereditary origin was

established and in an additional 11 per cent it was presumed. Dr. Schweitzer will discuss the subject with you, so I have deleted from this paper any extended discussion of these hereditary factors. I will mention a few points of particular interest to me as I studied the subject.

It is a long story, for the discovery of color blindness as an hereditary trait, as early as 1777, stimulated the interest of physicians as well as biologists in hereditary abnormalities of the eye. Geneticists have long collected family pedigrees of those afflicted with these conditions, and one has only to remember the enormous numbers of the famous fruit fly, *Drosophila*, which have been sacrified in experiments to prove the mechanism of transmitting the color of the eye, to realize what an enormous literature exists on this subject. I was impressed, however, with how often abnormalities in the eye had been studied without reference to the rest of the body. Is it possible that a closer collaboration of ophthalmologist, physician, and geneticist would have led to a more rapid development of knowledge? It is, for example, encouraging to see that in the past few years the careful investigation of the eyes of patients with other anomalies[5] and the increased search for evidence of generalized disease in patients with recognized hereditary disease of the eye are leading to a wider understanding of the various etiologic factors at work. But the pages are still covered with theories, and until one knows what defect is in the germ cell, what deleterious chemical or mechanical agent acts on normal germ plasm, can he do more than urge that those definitely afflicted shall be encouraged not to have children. Probably few of those who give guidance in these matters are well informed as to the dangers and non-dangers of transmitting hereditary eye defects. Germany, in July, 1933, by its act of protection against hereditary diseases, provided for the sterilization of persons with hereditary blindness on both voluntary and compulsory bases. It is to be hoped that some scientifically accurate figures may be kept of this experience.

Let us leave the hereditary and presumably hereditary diseases leading to blindness and look at the other so-called prenatal causes of blindness. And we may well be dismayed. In the study of 3,868 children in schools for the blind in 1938–39, 1,386, or 36 per cent, were merely labeled "prenatal origin, cause not specified."[1] Here

were 390 cases of congenital cataract, 203 of coloboma, 201 of congenital glaucoma, 146 of optic nerve atrophy. But what leads to these conditions? Texts are filled with long anatomical and pathologic descriptions. These though important first steps can hardly lead to any practical program of prevention. Again theories of causation abound, but the almost complete ignorance of the primal cause and the mechanism of production of the defect is astounding. Until one knows what intra-uterine inflammation, imbalance of what endocrines, what defective factor in nutrition is at work, he is in no position to do much more than study the problem further.

Are there any flickers of light which may lead us to the road of prevention? A few, so let us look at them. Already we have seen a way out through the prevention of prenatal syphilis, gonococcal ophthalmia, and the possible curtailment of reproduction of those carrying chromosomes bearing genes which inevitably lead to blindness. Are there others?

Hemorrhage

Hemorrhage or bleeding is often suggested as a basic cause for several congenital defects. Hemorrhage in the orbit or in any part of the eye may well lead to permanent damage. Hemorrhage in brain centers can also affect vision by injuring nerve connections, control of eye muscles, et cetera. Direct injury to facial nerves or brachial plexus has long been known to leave its mark on the eye as well.

Hemorrhage may occur during pregnancy, at the time of delivery, or perhaps after birth, for let us not forget that the human eye is by no means fully developed at birth. Knighton[7] has reviewed this subject in one of the publications of your Society only recently. The hemorrhage associated with the injury at the time of birth demands special consideration. When one thinks of the possibilities of injury associated with forcible removal of a head in instrumental deliveries or of a long period of pressure on the head during prolonged deliveries, one knows that better care at the time of delivery will lead to a reduction of the cases of blindness attributed to prenatal causes. The obstetrician plays the essential rôle in that he can largely control when and how the head of the infant shall be delivered.

The tendency of the newborn to bleed has long been recognized. Is it possible that this tendency is responsible for a certain percentage of congenital eye defects? Retinal hemorrhages, for example, are not uncommon. The significance of such hemorrhages has often been questioned by pediatricians who see many of these infants grow to maturity without impairment of vision, though unquestionably others are not so fortunate. More widespread hemorrhage in the newborn is also not uncommon. Is it possible that vitamin K, which is used effectively to combat certain hemorrhagic tendencies in adults and infants, can be of use in reducing defects in the eye attributable to hemorrhage?

Evidence for this view seems to be convincing. The workers at the Johns Hopkins Hospital[8] have for several years studied the effect of vitamin K on mothers and newly born infants. Carefully controlled studies have been made. Retinal hemorrhages have been reduced from 32 per cent in cases receiving no treatment, to approximately 15 per cent when the vitamin K has been given during labor, and almost no hemorrhages in cases receiving therapy four days prior to labor. The vitamin may be given directly to the infant if it has not been given to the mother, but predelivery administration is more desirable. Several hospitals are using vitamin K routinely in all deliveries, for it not only reduces retinal hemorrhages but stops bleeding elsewhere, particularly in the brain, which may, as we have previously stated, also serve to protect the child from loss of vision. The structure of antihemorrhagic vitamin has only recently been elucidated. A number of naphthoquinone compounds possess vitamin K activity. It is not expensive and may be administered in a convenient tablet to be taken by mouth, or it may be injected parenterally.

Nutrition

In these days of feverish activity and discussion of the problems of nutrition, one may well ask if the nutrition of the mother has any effect upon loss of vision in her baby. The effect upon the eyes of deprivations of vitamin A and some of the factors in the B complex has been recognized for so long, and so widely discussed, that it seems unnecessary to review the story here. Let us remember, however, that these observations do not prove that adequate nu-

trition in mothers will prevent congenital blindness. There is no evidence to support such a thesis. In the present day enthusiasm for nutrition, let us remember that campaigns and slogans built upon insufficient scientific fact may do more harm than good. We have only to remember that fallacious cry of "a clean tooth never decays" to remember how easy it is to teach the public something we have to ask them to cast aside at a later date. Let us be cautious today.

However, several observations are of interest and do suggest the importance of an adequate diet of the pregnant mother to the child and his sight. Thus, in analyzing experience in Danish institutes for the blind over 26 years, from 1895 to 1921, Norrie[2] points out that 44 out of 88 cases of xerophthalmia found appeared in the six years of the World War period when there was a lack of milk and vitamin A. In Toronto, within the past year, certain results have indicated that adequate nutrition of the mother leads to fewer stillbirths, miscarriages, premature births, prenatal anemia, toxemia and illness of the infant during the first six weeks of life.[9] Three groups of mothers were watched—all from low income groups. First, a group on good diets when first seen, who were advised in making their diets as good as possible; second, a group on poor diets to whom were given daily certain supplements; and a third group left on a poor diet, as controls. These studies are subject to certain criticisms and will need further confirmation before one is justified in building a widespread program on their results, but it is obvious that they are important and may have further significance in programs for the prevention of blindness. The existence of lamellar cataracts in patients who also show other evidences of nutritional deficiency (enamel of the teeth) is often quoted as evidence that such defects are due to nutritional deficiencies of the developing lens.

The Question of the Rh Factor

In searching for adequate explanations of causation of the congenital and hereditary conditions about which we have been talking, one seizes upon any new discoveries which may explain irregularities in the normal development of the fetus, on the presumption that these may be of aid in explaining eye defects as well. Re-

cently a very exciting chapter has been written in the story of one such abnormality, namely, that of *erythroblastosis fetalis*, a severe hemolytic anemia of the newborn. It is estimated that it occurs roughly once in every 1,000 births. Some types show a familial tendency.

And now to the fascinating mystery story.[10, 11, 12, 13] In 1940, a strange antigen (the Rh factor) in the red blood cells was first described by scientists who have long been interested in various characteristics of human and animal bloods. Of the population, 85 per cent was found to have such a substance, and in the other 15 per cent it was lacking.[10] It was only natural that the scientists, always curious, wanted to study these phenomena further, even though there seemed no immediate reason to believe that they were associated with disease. By such curiosity is science often advanced—"smelling down all rat holes," it was once called. And so the Rh factor was injected into rabbits and an antibody was formed for it—an antibody which would cause red cells to clump together in a test tube or dissolve in the body. The factor was apparently inherited as a *dominant*.[11] And finally to a new theory—could it be that a mother whose blood cells contain none of this Rh factor, if married to a man whose blood cells do contain the antigen, will have a child whose blood cells will be like those of his father? If so, would she not develop antibodies toward the antigen contained in her own child's red cells? And, finally, if these antibodies penetrate the placenta, will they unite with the red cells of the developing fetus and cause destruction of the red cells of that fetus? A weird theory—but it seems to be working. In 200 cases of severe hemolytic anemia of the newborn, all infants and fathers have had the Rh factor and in 93 per cent the mother has lacked it.[14] The story is not completed and there are other chapters already written which are of great interest.

You may ask why we should discuss such a tale at all—not merely because here emerges a possible explanation of some of the eye defects which have long disturbed us, but because this is an example of how many apparently unrelated fields of research may contribute some day to our fundamental problem of learning the mechanism of production of some now unknown phenomenon.

Other Problems in Prevention

Let us suppose that certain infants are born with certain eye defects due to hemorrhage, nerve injury through pressure, or any other cause. Is there anything that can be done to prevent, in the face of such injury, the development of impaired vision? Most certainly the answer is, yes. Injury to the lids may expose the cornea to a keratitis which can be avoided with proper eye hygiene. Direct injuries to the cornea during or near birth through, for example, trauma or the use of too concentrated a solution of silver nitrate can lead to corneal opacities, but the number of infants who enjoy the benefits of a visit from the ophthalmologist at this time is too small. Conjunctivitis may be due to infection not only by the gonococcus, but by the pneumococcus, streptococcus, staphylococcus, or other pyogenic organism. Early chemotherapy may save the spread of these infections. Obstruction of the lacrimal ducts may be seen in newborn infants, but is usually not recognized until the age of 4 to 5 months. Premature and unskilled probing may well lead to serious damage.

These, and many other examples, point to the great need for further collaboration between the ophthalmologist and the physician who cares for the infant and young child. The latter often knows little of how to make an adequate examination of the eye of a newborn. The small retinal hemorrhage may be the sign of a more serious hemorrhage elsewhere, and an indication for immediate measures to control further bleeding, but how many infants being examined have a retinal examination? The nurse is most closely associated with the newborn, but how much does she know of the importance of early signs of abnormalities in the eye?

That earlier diagnosis of certain conditions can lead to the prevention of later impairment of vision seems axiomatic and is also borne out by those who have studied children in institutions for the blind. Thus Masters,[4] who examined carefully 187 children at the Indiana State School for the Blind, stated that the diagnoses which committed these children to the institution are nothing short of scandalous. The causes of blindness given on entrance applications included "neglect," "following flu," "Eye-ritis," and a score of equally descriptive terms, all in cases which subsequent examination proved were due to causes which are well recognized and readily

diagnosable. If the medical care given these children after entry is no better, one can expect that many cases will probably become totally blind, when at least some vision might have been preserved.

Moreover, some of these children had sufficient vision that they should never have been taught with the blind, but should have been out learning to use what sight they have. Probably sight-saving classes in a regular school were all they needed. And let us remember, visual acuity is not merely dependent upon the condition of the eye. We probably, as has been aptly said, "learn to see." If there is not stimulation, no direct effort to teach a child to see, will he learn it? Moreover, in terms of psychological rehabilitation it is obvious to the child specialist that the segregation of such children may be adding more to than subtracting from their total handicap. It is obviously questionable, too, if this is an economically sound way in which to solve the problem. But I am digressing from my topic.

Summary

What does all this maze of information and lack of it lead to in formulating a program which the National Society for the Prevention of Blindness might urge in the field of prevention of blindness due to factors associated with pregnancy and delivery? Certainly "Now we see through a glass, darkly"—and to quote again from that famous chapter, for "we know in part, and we prophesy in part," but let us see whether we cannot agree upon a few points:

1. There is no question that there is great need for more fundamental research. There should be research which will ultimately lead us to have exact knowledge of the primal causes of the defects we have described and specific measures for their prevention. Such research cannot be done by any one group of specialists. Research, too, must be directed towards developing methods of diagnosing earlier the defects which later give trouble.

2. There is little question that there is great need of educating the physician, nurse, social worker, marriage counselor, pastor, parent, school teacher and school child appropriately of the danger of inheritance of certain eye defects—but only those which science has shown are definitely dangerous. An honest effort can be made to learn whether an hereditary con-

dition exists and to present the facts of the case frankly to parents and prospective parents. This may be considered primarily the job of the physician, but the nurse can contribute much by careful history taking, calling the physician's attention to the presence of eye conditions in other members of the family, and, with the physician's consent, interpreting to families the probable nature of the defect and what it means both in terms of the likelihood of additional cases if the family produces more children, and in terms of the need for close ophthalmological supervision of all members of the family who may have certain hereditary tendencies. Social workers, teachers, pastors, guidance personnel, all may be useful, too, in spreading appropriate information. I doubt if the routine pre-conceptional consultation which seems an ideal solution to the problems will be effected until we are willing to change radically the curricula of our secondary schools and accept realistically the fact that our children will not be prepared for parenthood unless we make moves to prepare them.

3. The need to have closer co-operation between those chiefly concerned with the eyes and those concerned with other medical care of the child and his parents is obvious. It would sometimes seem as if the one group acts as if a child, for example, were all eyes and the other, that he were a child without eyes. Increased co-operation should lead not only to increased knowledge but to more attention to the earlier discovery of remediable eye conditions, and to more adequate treatment of those who are found with such defects. Let us remember, too, that if we do not demand a better diagnosis and more precise recording and analysis of what we do find, we shall be in no position to know where or what our problems are.

4. The need to urge adequate prenatal care program and good care at the time of delivery is an old story. But we are far from achieving our goals either with the public or with the profession. Women still do not seek out doctors to find out whether they are healthy enough to have babies, nor do they go to doctors as soon as they know they are pregnant. Preconceptional care for those who desire it is not often given by doctors, who also miss many opportunities to render adequate prenatal supervision. Probably one of the chief results of prenatal supervision has been the reduction of severe toxemias of pregnancy—and it is often suggested that this is associated with congenital blindness. More adequate nutrition may also be important, though conclusive evidence is lacking. However, certain procedures are of proven value in preventing congenital

blindness, and in prenatal treatment of the syphilitic, in the administration of vitamin K before delivery, and in the specific prevention of ophthalmia neonatorum. The value of one of the last mentioned has been known for half a century, but there is still ophthalmia neonatorum. Must we wait another fifty years to use the tools we have developed since then to prevent blindness in children? And is it not time that we consider a good prenatal program and good care at the time of delivery a contributing factor to a program for prevention of blindness?

References

1. Kerby, C. Edith. "Eye Conditions among Pupils in Schools for the Blind, 1938–39." *Outlook for the Blind.* Vol. 34, p. 164. December, 1940; and large chart prepared by the Committee on Statistics of the Blind, 1790 Broadway, New York, N. Y.
2. Norrie, Gordon. "Causes of Blindness in Children. Twenty-five Years' Experience in Danish Institutes for the Blind." *Acta Ophthalmologica.* Vol. 5, 30 pp. 1927.
3. Britten, Rollo H. "Blindness, As Recorded in the National Health Survey—Amount, Causes, and Relation to Certain Social Factors." *Public Health Reports.* Vol. 56, pp. 2191–2215. 1941.
4. Masters, Robert. "Causes of Blindness Among the Children at the Indiana State School for the Blind." *Journal of the Indiana State Medical Association.* Vol. 31, pp. 537–539. 1938.
5. Ridley, F., and Sorsby, A. "Hereditary Syndromes with Ocular Manifestations." *Modern Trends in Ophthalmology.* London: Butterworth & Co., 1940.
6. Masters, Robert. "Lessons Learned from a Blind School Survey." *Illinois Medical Journal.* Vol. 72, pp. 309–313. 1937.
7. Knighton, W. S. "Development of the Normal Eye in Infancy and Childhood." *Sight-Saving Review.* Vol. 9, pp. 3–10. March, 1939.
8. Maumenee, A. E., Hellman, L. M., and Shettles, L. B. "Factors Influencing Plasm Prothrombin in the Newborn Infant. IV. The Effect of Antenatal Administration of Vitamin K on the Incidence of Retinal Hemorrhage in the Newborn." *Bulletin of Johns Hopkins Hospital.* Vol. 68, pp. 158–168. 1941.
9. Ebbs, J. H., Tisdall, F. F. and Scott, W. W. "The Influence of Prenatal Diet on the Mother and Child." *Journal of Nutrition.* Vol. 22, pp. 515–526. 1941.

10. Landsteiner, Karl, and Wiener, A. S. "An Agglutinable Factor in Human Blood Recognized by Immune Sera for Rhesus Blood." *Proceedings of the Society of Experimental Biology and Medicine.* Vol. 43, p. 223. 1940.

11. Landsteiner, Karl, and Wiener, A. S. "Studies on an Agglutinogen (Rh) in Human Blood Reacting with Anti-Rhesus Sera and with Human Isoantibodies." *Journal of Experimental Medicine.* Vol. 74, pp. 309–319. 1941.

12. Levine, Philip, and Katzin, Eugene M. "Isoimmunization in Pregnancy and the Varieties of Isoagglutinins Observed." *Proceedings of the Society of Experimental Biology and Medicine.* Vol. 45, pp. 343–346. 1941.

13. Wiener, A. S., and Peters, Raymond H. "Hemolytic Reactions Following Transfusions of Blood of the Homologous Group." *Annals of Internal Medicine.* Vol. 13, pp. 2306–2322. 1940.

14. Personal communication.

Heredity in Relation to Blindness and Its Prevention*

Morton D. Schweitzer

SOME of the hereditary diseases which are known to lead to serious impairment of vision are discussed by Dr. Schweitzer, who calls attention to the necessity of informing those who have an hereditary condition of the possibility of transmission.

IN discussing the role of heredity in blindness, I want to start with a consideration of the prevalence of hereditary blindness. Unfortunately, accurate statistics are not available, so that it is possible to present only an approximate estimate, which may be subject to wide error.

In a general way, it is known that hereditary factors are far more important in childhood cases than in those which have later ages of onset. The etiological breakdown of eye conditions among pupils in schools for the blind in 1938 and 1939, as published by Miss Kerby last year, would suggest that about half of the reported cases may be classified as of prenatal origin. As Dr. Baumgartner has already shown us, many cases now included in the prenatal group should not be considered hereditary at all; and, undoubtedly, in earlier studies of familial incidence, cases were reported as hereditary, due to the failure on the part of the investigator to evaluate those factors which were prenatal but nevertheless non-hereditary. One may hazard a guess, then, that perhaps half of the prenatal group, or one-quarter of all childhood cases, are genuinely hereditary. In the adult cases, the basis for an adequate estimate is even less satisfactory. No adequate survey is available; in addition, for two of the most important conditions leading to blindness, that is,

* Presented at the Biennial Conference of the National Society for the Prevention of Blindness, New York City, December 5, 1941.

cataract and glaucoma, the role of heredity has not been established, which makes an estimate even more uncertain. Most conservative workers give an approximation of 10 per cent hereditary cases in adult blindness, but this is frankly speculative. It is one of our most important problems to make our future estimates more accurate than the guesses to which we must at present resort.

Perhaps it would be in order at this point to give a few simple facts about heredity by reference to diseases which are known to lead to serious impairment of vision. Congenital ptosis and familial types of corneal opacities may be mentioned as illustrations of simple *dominant* inheritance. In these cases we will usually find that the condition occurs in about half of the children of an affected individual; further, an affected individual generally has an affected parent. Normal individuals, even if descendants of cases, do not transmit the trait.

Sex-linked inheritance is involved when a given condition occurs principally in the sons of a family, although the daughters of the same family are often involved in its transmission. This type of inheritance occurs in megalocornea and in certain instances of nystagmus. The rules covering transmission in this type of inheritance are as follows: Sons of affected fathers are characteristically normal, and normal males do not transmit the condition. The daughters of a case are normal but are carriers, and may transmit to half of their sons. Normal mothers and sisters of cases are often carriers and may transmit to many of their sons. In fact, a sex-linked condition may be carried through several generations of female carriers before reappearing in a male member of that family. Cases in women may occur when an affected male marries a carrier female.

The third type of inheritance is known as *recessive*, and here infantile glaucoma and congenital day blindness may be taken as examples. These conditions may occur in brothers and sisters and cousins and other more distant relatives, but are usually absent in the parents of cases, and are also absent in the children of cases. Because the human family is so small in comparison with the animal and plant groups, we frequently find sporadic cases of these recessive traits: but where the family is sufficiently large, we can usually find cases in collateral relatives. In these recessive condi-

tions, we are more apt to find a greater than average prevalence of cousin marriages. This is true not because cousin marriages are in themselves harmful but rather because within these family stocks the undesirable hereditary trait is more likely to be present in both mates when they are cousins. In other types of inheritance, cousin marriage is usually of little significance.

This briefly covers the three principal mechanisms of heredity, and by these we may ordinarily be guided in making our estimate of any given family situation. However, exceptions to these rules as outlined are known, and before applying them to a given case, it is important to have available adequate information about the family, so that we may judge whether this simple résumé is adequate for the case under review.

It is also important to point out that having one of the traits just enumerated is not synonymous with eventually becoming blind. For example, not all corneal opacities are hereditary, and not all individuals who are affected with hereditary corneal opacities will necessarily become blind. That is, within a family, the trait may be present in three or four members, but in only one or two of them might it be severe enough to reduce vision below the level of useful functioning.

Very little is as yet known about the role of heredity in most eye diseases. Even in those in which it is suspected of being an important element, we do not usually know enough to be able to make an authoritative statement on the specific mechanism of inheritance. We do know that the subject is far more complex than was at one time believed. It is no longer rare to find that two individuals whose medical diagnosis is very similar (for example, microphthalmos) may nevertheless exhibit quite different patterns of heredity in their respective families. Accordingly, we must expect to put a great deal more hard work behind us before we shall be in a position to answer the pressing questions regarding heredity in diseases of the eye.

I am sure we are all interested in the practical use to which we may hope to put our knowledge of heredity in the field of eye diseases. Not so long ago it was thought that the most important immediate application of heredity in medicine would consist of education for the restriction of families in which serious hereditary

diseases are known to occur. But our experience has shown us that this is not the only, nor perhaps at the moment the most important, factor to be considered. For it is a fact that only a very small percentage of the blind are offspring of blind parents. If we extend the group to include those who have blind relatives (excluding, of course, traumatic and infectious cases), the proportion is larger but still far from constituting the major immediate problem in blindness prevention. On the other hand, we may not withhold information but must stand ready to help those who request it regarding the risk of transmission of a trait known or believed to be hereditary. Not infrequently, individuals who do not wish to pass on their own affliction to their children are led to do so due to the ignorance of physicians on the subject of heredity.

I would like to go on by refuting one type of pessimism that is frequently encountered in professional circles on the subject of heredity in disease. It is often stated that while medicine may be able to treat and cure a pathological derangement of a formerly normal tissue, we have no means of providing parts which may be lacking due to some hereditary abnormality. At one time this fear was perhaps not inconsistent with the status of medical and surgical knowledge, but now we need no longer be bound by these restrictions. I need only point to the technique of corneal grafting, for example, as affirmative evidence that the medical horizon is truly unlimited and that hereditary diseases will eventually be as easily treated and cured as any other.

There is an important field which offers hope of rapid preventive accomplishments through knowledge of heredity. I have in mind the latent cases among the relatives of the hereditary blind, to which I have already referred. Glaucoma is perhaps as good an example as we can find. While there is no known method at present of restoring the vision of far advanced cases, ophthalmologists are often able to arrest incipient cases of glaucoma and to prevent further loss of vision in patients whom they can keep under observation and treatment. Facts which have come to light make it apparent that the use of case-finding methods in the families of the glaucoma blind will yield rich returns in the field of blindness prevention. Here is indeed a job to which the full resources of official and voluntary agencies may be put with great effectiveness.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request.

Chronic Glaucoma*

Definition

Glaucoma is a disease affecting the eyes. It is characterized by an increase in intraocular pressure, with loss of vision. Without proper treatment, blindness results. Vision lost from glaucoma is never regained.

Incidence

Approximately 20,000 patients are blind from glaucoma and are receiving aid from organizations for the blind. An analysis of material from clinics and from private ophthalmological practice shows that there are between 150,000 and 200,000 patients with glaucoma in the United States. There are many more patients with this disease who have never visited the ophthalmologist and are untreated. No age is immune to the disease, but it is most common among persons of 40 to 70 years of age. No geographical difference in the distribution has as yet been noted.

*Prepared for the general practitioner.

Symptoms and Signs

Glaucoma is a bilateral disease. It is unrecognized in many individuals because the symptoms at times are so minimal that they are disregarded by the patients. Intermittent slight discomfort in the eye, heaviness of the eyelids, slight aching in the eye or in the temple, or rainbow-colored halos—any one of these, or all, may be the symptoms. Vision may be blurred for a short period of time and then apparently return to normal. Reading glasses may be fitted and have to be changed repeatedly in a short period of time. Emotional strains of anger, worry, fear, disappointment, or dietary indiscretions may precipitate these symptoms, which entirely disappear after a few hours. One attack is followed by another and yet another. Sooner or later,

following each attack, the physician can observe definite loss of vision.

Central vision is maintained usually until the later stages of the disease. The peripheral vision is lost first, with only a slight defect being present in the visual field. With each succeeding attack more vision is lost until there is only a small island of vision left. To measure progress of the disease, peripheral and central visual fields should be taken repeatedly with very small test objects.

Increased intraocular pressure is characteristic of the disease. The etiological factors producing this condition are not known. The increased intraocular pressure causes most of the symptoms and signs. In the early stages of the disease this increase in tension appears intermittently, but in the later stages it is always present. In the normal individual, pressure varies with activity, emotion, and time of day. It is higher in the morning on awakening, after being in the dark for a considerable period of time—for instance, at the end of a movie—and after ingestion of certain stimulants. It is higher when the pupil is dilated and lower when the pupil is contracted. Any medication which dilates the pupil is likely to raise the intraocular pressure. Any of the above factors are likely to precipitate an attack of the disease.

In exceptional cases the elevation of intraocular pressure to a point considered pathological may not be demonstrated or proved because the normal pressure for these cases is probably below average.

The problem of measuring rise in intraocular pressure is sometimes so difficult that it is necessary to take pressure measurements at two or four hourly intervals during the day and night.

Detecting Glaucoma

Intraocular pressure is measured by the ophthalmologist with a tonometer. Several types of instruments are used, with different standards for each type. However, this method of measurement should be left to the ophthalmologist. Any physician can get a rough idea of the presence or absence of increased intraocular pressure by this simple means: have the patient look down at his feet, place the second, third, and fourth fingers of each hand on the forehead on either side of the eye, place the tips of the index fingers gently on the upper eyelid above the tarsal plate, so as to palpate the sclera, not the cornea, then put enough pressure first on one finger then on the other to compress the eyeball. By judging the amount of pressure which is necessary to indent the eyeball one can roughly determine deviation from the normal. As a control, the physician can readily test his own eye.

In the more advanced stages, the pupil is dilated and responds poorly to light and accommodation. The

depth of the anterior chamber is decreased, and the iris and lens seem to be closer to the cornea than normal.

Late in the disease a very characteristic picture is seen with the ophthalmoscope. The optic nerve presents moderate or deep cupping, more marked on the temporal side. The optic nerve in this area is pale. The blood vessels that run over the optic nerve in this region do so in a peculiar manner. They run from the retina and over the edge of the sclera, disappear in the excavation, and then reappear. This picture is characteristic of glaucoma and is easily identified. A physiological cupping which is normal is sometimes confused with glaucomatous cupping, but the full course of the blood vessels, the absence of depth and extent, and relatively normal color are distinguishing features.

The pupil of an eye suspected of having glaucoma should never be dilated, as serious consequences may result.

In many instances, by the time the patients consult their physicians, they are practically blind in one eye and have a great deal of loss of visual field in the other. It is both desirable and possible for glaucoma to be diagnosed before any visual loss has occurred, because vision destroyed by this disease can never be regained.

Glaucoma is often mistakenly diagnosed as cataract. Once the disease has been correctly diagnosed, patients must remain under observation the rest of their lives.

Treatment

The amount and kind of treatment should be judged by the ophthalmologist.

The first aim is to lower the intraocular tension, and the second aim is to prevent its recurrence.

The first part of the treatment should be under the direction of the ophthalmologist, who should determine whether medical or surgical treatment is indicated. The follow-up treatment is essential. Even though the patient feels that his eyes are doing well, they should be carefully examined from time to time as they may possibly require a change of medicine or surgery. The patient is no judge as to the condition of his eyes or as to the progress of the disease. Many times he will feel that there has been no change but still, on examination, further visual loss is found. There is no place for guessing if glaucoma is to be controlled. Repeated observations are essential to aid in helping control the advances of the disease.

Forestalling another rise in intraocular pressure, the second phase of treatment, is equally important and the family physician or general practitioner can be of great help. Such help consists in persuading the patient to follow these rules:*

* Suggested by the Committee on Glaucoma of the National Society for Prevention of Blindness.

1. Avoid, as much as possible, excitement, anger, worry, fear or disappointment, as these are apt to raise the intraocular tension.
2. Take care that eliminations are regular.
3. Avoid tight-fitting clothes.
4. Keep blood circulation active.
5. Keep teeth clean and healthy. Pay careful attention to acute or chronic colds.
6. Avoid alcoholic drinks. Limit coffee and tea to one cup a day.
7. Sleep in a well-ventilated but not too cool room.
8. Avoid dark rooms as much as possible, and if at movies do not stay too long.
9. Do not use eye washes without consulting the eye physician.
10. Have periodic general physical examinations.

Remember!

Whenever a patient complains of vague disturbances of vision or symptoms about the eyes, keep the possibility of glaucoma in mind. The use of the fingers in taking intraocular tension will give you a lead. In the more advanced stage of the disease, the use of the ophthalmoscope will also give you a lead. Do not hesitate to call in an ophthalmologist. You may be the one to save that patient's eyesight by suspecting the disease and getting treatment started before loss of vision sets in.

Remember, glaucoma! Every patient over the age of forty years is a candidate for the disease.

—C. Gregory Barer, M.D.
New York, N. Y.

The Eye in Aviation*

Eye Examination for Pilots

The examination of an airplane pilot's eyes is the first and most important step in his or her physical examination, and is divided into several different procedures.

First, visual acuity is tested, using eye chart at a distance of twenty feet and examining each eye separately, having other eye closed or covered with fairly large opaque card and not by the hand or some small object. The applicant must not be allowed to squint, but must keep eyes open in normal position. It is surprising how a myopic individual or near-sighted person can improve his distant vision by forceful squinting, thus giving an inaccurate visual finding. If one eye is suspected of being worse than the other, then it should be tested first.

Second step in the eye examination is depth perception. In this test the Howard-Dolman depth perception apparatus is used. It is a rectangular box-like apparatus, approximately forty inches by twelve inches and twelve inches deep, with

* Extracted, with permission, from the article, "The Eye and Ear in Aviation," appearing in the *New Orleans Medical and Surgical Journal*, Vol. 94, No. 1, July, 1941.

an open top and sides, and has two black metal rods; one rod being stationary, the other moved by a cord at a distance of twenty feet, with a plain white field as a background. The accuracy with which the pilot approximates the rods is an excellent check up on his or her ability to judge distance in landing and taking off in an airplane. However, I have in mind one experienced pilot, with over five thousand hours' flying time and sixteen years of flying, who never makes a good showing with the depth perception test. It may be he does not take much stock in such a test or does not try to do his best. Yet, this test has been proved to be an important step in the examination of flyers.

Third, the ocular muscle balance test is given to find if diplopia or hyperphoria is present, and if abduction (prism divergence base in) and adduction (prism convergence base out), esophoria and exophoria are within normal limits. These findings are very important and diplopia to any marked degree disqualifies; in fact diplopia disqualifies unless it develops in the extreme limits of the visual field. Hyperphoria of over one diopter restricts the pilot to a non-commercial flying status.

The few persons I have found with hyperphoria to any marked degree have all given the same general history of a severe blow on the head and showed scars as evidence of the injury. One young commercial pilot fell from an automobile and suffered a serious head injury and concussion; months after his recovery he had such a marked hyperphoria that he was advised to stop flying. Another youth failed to get into the Civilian Pilot Training because of hyperphoria; and the scar on frontal bone area, caused by a fall from a bale of cotton several years prior to examination, was the only known cause of his abnormality.

Fourth, the accommodation or near vision is tested and here the young individual passes with the higher rating. The older pilot, approximately forty-five years of age, in most cases, fails to read the small test letters and has to qualify as a non-commercial pilot, the commercial pilot being the higher rating. The natural question arises as to why penalize the older person for presbyopia when reading glasses will correct this condition. The answer is simple; when the eye reaches this stage in life the reaction time of changing from near to distant vision is slowed up, and in fast airplanes of today and certainly in the combat military planes where the landing speed is high and flying speed is terrific, the presbyopic eye can not read the instruments on the nearby instrument panel and at the same time take care of the distant objects and landmarks that are flashing by. This is where split-second timing is not only essential but vital, and the

older individual's eyes cannot make the grade.

I have in my files the record of a man past fifty who first flew an airplane when he was over fifty years of age, and while he had a non-commercial or private pilot's license, he was considered a good pilot. However, he and a member of his family crashed and were killed when flying through a rain storm. The crash might have occurred even with the best qualified young commercial pilot at the controls; yet one cannot forget that failure rather than plane failure seems more likely.

Fifth, the visual fields are tested by simple finger and fixation method, unless some apparent blind spot is suspected; then the perimeter is used.

Sixth, the central color vision is tested, using Stillings or Ishihara tests, these two being pseudo-chromatic plates; these two tests are very delicate or difficult to pass if there is a slight color vision defect, and where some of the numbers are missed, the Holmgren test (colored yarns) is used. If all colors are matched correctly a normal color vision is recorded. An airplane pilot must be able to detect colored navigation lights, airdrome lights, colored signal panels and be able to read maps printed in colors, and know shades of green and brown on the ground that indicate the kind of territory over which he or she is flying and which help in locating an emergency landing field, should the occasion arise.

Some recent tests have been made on the ability of color defective persons to detect hidden and camouflaged planes and other equipment from airplane observation posts. And I understand the observers with color vision defects were better able to find the camouflaged planes and other objects than those with perfectly normal color vision. If this is true, then there is very urgent need for color blind or color-vision defective observers for more efficient airplane observation.

Seventh, the eyes must be of normal size, and pupillary reaction to light and accommodation must be normal. The ophthalmoscopic examination must show normal media, disks, blood vessels and retinae.

This brief and rather rapid summary of the eye requirements may seem too strict or too difficult for many applicants to pass; however, remember the qualifications above mentioned are for the commercial pilots of the highest standing, and there are modifications for the commercial grades also. Recent regulations permit the issuance of a commercial rating to pilots whose vision is 20/50 or better in each eye and whose vision is brought up to normal, or 20/20 in each eye, by use of correcting lenses.

Requirements for Other Fliers

The requirements for the non-commercial or private flyer are much less exacting. The vision of the

private pilot may be twenty-two hundredths (20/200) or even less, providing correcting glasses bring the vision to twenty-thirty (20/30) in each eye. Then he or she can be given a private pilot's license rating, with the notation on the certificate that correcting lenses must be worn by holder when operating aircraft; this same notation is placed on the commercial pilot's license where glasses are necessary for normal vision. Over ninety-five per cent of all applicants with poor vision that I have examined have been myopes and glasses have made these people see normally in practically every instance.

If the pilot should lose or break his or her glasses while in flight, then the chance of making a safe landing would be very much less than under normal conditions. The fact is that most planes are made with much better protection for the pilot, and many planes made now are closed models which makes the pilot wearing glasses much less likely to suffer an accident to correcting lenses while in flight. It is considered safer and better to wear metal frame correcting lenses beneath plain protective goggles instead of using specially ground goggle lenses. The fact that an individual has become accustomed to the glasses worn, their size, shape and weight, makes it better and more comfortable to use regular spectacles and goggles over them.

In the muscle balance test the applicant having more than one diopter of hyperphoria cannot be qualified as a commercial pilot, but hyperphoria does not disqualify for non-commercial or private grades. Color blindness is not a disqualifying factor for the private pilot.

The presence of nystagmus or strabismus, or ocular diseases or abnormalities, disqualify for all grades of airplane pilot licenses.

Some rather interesting work on intraocular pressure at high altitudes by Pinson and Armstrong has been done to see just what takes place under such conditions. The tests were made on rabbits' eyes and the needle was introduced into the vitreous humor and connected up with the manometer. The live animal and manometer were placed in low pressure chamber, where various rates of pressure changes up to an altitude of forty thousand feet were made. The results of these tests showed even the most extreme barometric pressure changes caused no significant increase in the intraocular pressure at any time.

—Dorf Bean, M.D.
Shreveport, La.

Nutrition and Sight*

Night blindness due to faulty diet has been known since very ancient times. The Egyptians have writ-

* Reprinted from the *Danish Red Cross Review*, November, 1940, and communicated by the Secretariat of the League of Red Cross Societies, Geneva, Switzerland.

ten descriptions of this complaint, and they recommended liver as a remedy. In modern times, it has been observed, particularly in Russia, during Lent, among undernourished persons. It has also been found to exist in institutions where the diet is less varied than in individual households.

As research work on the subject of vitamins has progressed, it has become apparent that night blindness is due to the lack of vitamin A in the diet.

The ability of the eye to adapt itself to varying degrees of light is very great. Everyone knows that it is difficult to see well when one goes from bright sunlight into a dark room, but that, after a certain time, the sight improves, and after half an hour in the dark the eye's sensibility to the light is 10,000 times greater. It is this faculty for adapting itself to the light that is impaired by the lack of vitamin A, and, precisely because this faculty is so great, it is possible to record the slightest lessening of it.

Complete night blindness, due to incorrect diet, is rare in Denmark. The milder forms of this affection interest us more particularly.

Before this war, when there was good lighting everywhere, it was rare for oculists' patients to complain of not being able to see well in the dark. Today, in the black-out, things are different. It is easy to understand how important it is for aviators, sailors, drivers, etc., to see well in the darkness. But for us who can stay at home, is the fact that we cannot see well at night of no importance? No, not in the least. It should be realized that night blindness is not an isolated symptom, but the sign of a lack of vitamin A in the whole system. Even if the tendency to night blindness is so slight as to be hardly noticeable, this lack of vitamin A may lead to other symptoms which are not unimportant.

First manifestations are a general tiredness, lack of spirit, nervousness, occasional headaches, frequent colds, lowered resistance to infection, extreme sensibility to cold, falling out of the hair, bad condition of the nails, a dry skin, dental decay, eyestrain, dizziness, irritated and inflamed eyes. These symptoms often occur in the spring, or become worse at that time of year if they have already been present before. All or certain of these symptoms may be accompanied by slight night blindness; and they disappear after a treatment of vitamin A, the night blindness being the last to go.

No doubt more than one mother of a family will think: "In our case, this inability to see very well in the dark is not very important; we have good wholesome food." But I should reply: "Can you really be so sure of that? Are you never tired, do your children never have colds, are their teeth quite sound? Does nobody in the household have

headaches? And the old people, are they ailing?"

The answer will certainly have to be "yes" to some of these questions. I only want to tell you that often too little attention is paid to these slight ailments; people are so used to them that it seems normal not to be in perfect health, especially in old people. And yet this is not necessarily the case.

In a great many cases all that is needed is a diet richer in vitamin A. But don't imagine that everything will be changed at a stroke. If for years you have had a faulty diet, you will have to be patient. Don't think that you will be full of health and strength because you have had a rich diet of vitamin A for a week. Nor should those who wish to keep their good health forget all about it, once the danger is passed.

But you will ask: "What food should I give my family in order to be sure that they are getting enough vitamin A?" Naturally, that depends on how much you are able to spend on meals. Foods rich in this vitamin are usually expensive. One consolation is that you can manage with less vitamin A if your meals are varied and rich in other vitamins. I should recommend that you eat only whole-wheat and rye bread, which is no more expensive than white bread. Bread is our principal food, and for that reason it is extremely important.

Vitamin A is found in the vegetable kingdom as well as in the animal kingdom. It is found in the sea, especially in the small green seaweeds. In plants, it exists particularly in the green parts, for instance, in cabbage, spinach, lettuce and green salads, green beans, and in everything green; in the yellow or yellow-red fruits, such as tomatoes; and in carrots. Vitamin A when found in plants is in the preliminary stage; in animals, it is transformed into the perfect state. Animals eat the plants containing the vitamin, which is deposited in the various organs, especially the liver, and in the milk. The proportion of vitamin A in animal foodstuffs varies greatly. It is especially high in summer, when the animals have an abundance of green fodder.

The principal foodstuffs which contain vitamin A are milk, cream, butter, and cheese. Vitamin A is found in cream, but not in skimmed milk or whey. It is also found in margarine which has been vitaminized, and in eggs, fish-roe, liver, kidneys, and other vital organs; to a lesser degree in meat, although not in pork; in the oily fishes, such as eels and herrings, in fish liver, and in cod-liver oil, which is the richest vitamin-A-containing food that we have.

It will be seen that it is not an easy task to provide one's family with vitamin A both in winter and summer. Vitamin A may be cooked, but it is destroyed when fatty foodstuffs are over-roasted.

It would certainly be to our great

advantage to consider cod-liver oil as a food and not just as a medicine. Healthy children during the growing age should be given daily a teaspoonful or the corresponding quantity of the oil in concentrated form, if they do not like the taste of the ordinary oil. Healthy children do not all need the same quantity of vitamin A. The need for vitamin A is increased during infectious illnesses. Sick and convalescent persons should have it abundantly in their diet, so that their powers of resistance are not still further reduced.

It is well to remember in planning meals for yourself and your family that it is important to include every day several foodstuffs containing vitamin A.

—Helga Frandsen
Denmark

News of State Activities

THIS Section is devoted to the reporting of sight conservation activities carried on by official and voluntary agencies throughout the country. It presents information supplied by these groups, and serves as a medium for exchange of experiences. Only brief and timely items can be used, because of the limitations of space.

[EDITOR'S NOTE: In order to conserve space, and since there has been a diminution in the reporting from local agencies, this Section will be published only twice during 1942.]

District of Columbia

"Junior League volunteers are again helping to promote a prevention of blindness program in the District of Columbia.

"Following a brief course of instruction by two ophthalmologists and the Director of the Society for the Prevention of Blindness, the volunteers are testing vision of little children in settlement houses and private nursery schools."

—*District of Columbia Society for the Prevention of Blindness, Washington, D. C.*

Illinois

"The Twenty-sixth Annual Meeting of the Illinois Society for the Prevention of Blindness was held at the Standard Club on Monday, November 17, at 12:15 P.M. About 300 people were there, including the Fiscal Director of the State, two members of the Legislature and representatives from the following agencies: Cook County Public Welfare Board, State Department of Public Instruction, Chicago Board of Education, Board of Welfare Commissioners, the *Chicago Daily News*, the *Chicago Tribune*, the W.P.A., and the Chicago Council of Social Agencies. There were also representatives from 9 hospitals in Chicago and about 20 private social agencies which co-operate with the Illinois Society for the Prevention of Blindness.

"The meeting was given over to the reading of the annual report of the Society, which described the following achievements:

"1. Not a single case of blindness from ophthalmia in Illinois this past year. This is the first time in three years that the Society could report this.

"2. The growth of sight-saving classes to 91 in the state.

"3. The progress in trachoma control, showing that it is over the peak and the project is now being reduced because most of the cases have been cured. There were only 16 stage one cases discovered during the year, in spite of exhaustive diagnostic clinic work.

"4. Transfer of the glaucoma clinic work from the Society to the State Department of Welfare.

"5. The opening up of a project with the Blind Relief Division of the Cook County Board of Public Welfare on restoration of vision.

"6. A complete report of the legislative results obtained by the Society at the last legislature, which included the passage of the Fireworks Bill, appropriations amounting to $389,000 for sight-saving, appropriations amounting to $76,000 for trachoma, and appropriations amounting to $8,400 for glaucoma work."

—Illinois Society for the Prevention of Blindness, Chicago, Illinois

Minnesota

"The Minnesota Society for the Prevention of Blindness and Conservation of Vision provided eye examinations for 4-H boys and girls at the State Fair in September. Seven ophthalmologists and 22 public health nurses participated in this clinic. Several formal and informal discussions have been held at the Central and Western Divisions of the Minnesota Educational Association and at meetings of county Public Health Associations. The State Society is working with several counties in their efforts to get public health nurses and to interest teachers in vision testing of school children, especially in the rural areas. The Minnesota State Medical Association is co-operating with this Society in conducting a survey of the eyes of school children in a selected county of Minnesota."

—Minnesota Society for the Prevention of Blindness and Conservation of Vision, St. Paul, Minnesota

Missouri

"Through the efforts of Dr. John McLeod of Kansas City, an educational exhibit on glaucoma was prepared. This was shown under the auspices of the Committee on Conservation of Eyesight of the Missouri State Medical Association at the meeting of the Southern Medical Association, and a unit of it was shown at the biennial conference of the National Society for the Prevention of Blindness in New York City."

—Committee on Conservation of Eyesight, Missouri State Medical Association, St. Louis, Missouri

Tennessee

"*Sight Conservation Activities in Tennessee from July 1 to November 1, 1941.*—In the continuation of the survey of the blind of the state, 190 new cases of total and partial blindness have been studied; 126 of these cases were persons examined for Aid to the Blind, their eye examinations being furnished the Service by the Department of Public Welfare, and the remaining 64 were office cases, of which 48 were children and 16 were adults. This brings the number of totally and partially blind persons studied to date, by the Service, to 3,720, of which number 649 are children, and the Service estimates that its survey of the blind of the state is now about 92 per cent completed. The important facts coming out of this study are: that 55 per cent of this group have a chance, varying from an excellent one to an outside one, to have sight restored to them, in whole or in part, in one or both eyes; that 66 per cent of this blindness might have been prevented if the proper preventive measures had been in existence or available; and that our blind population is showing an annual increase of between 92 and 137 persons.

"In August another visual corrective program for indigent visually handicapped children of Perry County was organized by the Service with the Linden Lions Club, and this program began operation in September, bringing the total of visual corrective programs established by the Service to 14, 9 being with Lions Clubs and 5 with other organizations, giving this type of service to 13 of the 95 counties of the state.

"During this four months period the Sight Conservation Service has been able to arrange one or more types of ophthalmological services for 141 persons, 118 being children and 23 being adults, the types of services rendered being: eye examinations—104; refractions—92; 11 treatments for trachoma for 3 persons; 4 treatments for marginal blepharitis for 2 persons; and treatment for one case of chronic conjunctivitis; 12 visual recheck examinations; an artificial eye each for 3 persons, 2 being children and one being an adult; and 14 surgical procedures, being as follows: 4 cataract extractions; 2 eye muscle operations; 2 extractions of a dislocated lens; and one operation each for glaucoma, entropion, an artificial pupil, a capsular membrane, pupillary membrane, and chalazion, for 13 of whom hospitalization has either been furnished or arranged for by the Service. Also, 77 pairs of glasses were furnished 77 persons, 68 being children and 9 being adults, and of this number other organizations and interested individuals furnished 53 pairs and the Sight Conservation Service furnished 24 pairs."

—*Sight Conservation Service, State Department of Public Health, Nashville, Tennessee*

Note and Comment

Proceedings of the National Society's Biennial Conference.—The National Society for the Prevention of Blindness is publishing a large part of its biennial conference proceedings in the current and forthcoming issues of the REVIEW. Those sections which are not appearing in the REVIEW will be published as supplements, which we are offering to REVIEW subscribers without charge. In general it is not planned to publish separately individual papers given during the conference, and those readers wishing the proceedings will be able to have them by purchasing the issues of the REVIEW in which the papers appear, and the supplements, which will be sold at a nominal charge. The current REVIEW is being offered free of charge to all new subscribers whose subscriptions will begin with the March, 1942, issue.

National Maternal and Child Health Council Releases New Manual.—Under the title, "Hidden Hungers in a Land of Plenty—A Handbook of Nutrition Projects for You and Your Group," is an attractive collection, prepared by the National Maternal and Child Health Council in co-operation with the American Red Cross, the American Dietetic Association, and the American Association of University Women, which has recently reached our desk. It describes briefly ways by which local communities may put into operation the recommendations of the National Nutrition Conference for Defense of May, 1941. Written in a lively manner, it should be of interest to any club or study group, as well as to those engaged in public health work. The handbook is available at the Council, 1710 Eye Street, N.W., Washington, D. C., for twenty-five cents, and the Council will welcome all comments and suggestions for improvement. The Council also releases lists of readings, pamphlets, posters and exhibits, and films, which are especially useful to those interested in maternal and child health teaching.

Syphilis and Gonorrhea Responsible for 17 Per Cent of Blindness.—Syphilis and gonorrhea are among the major destroyers of sight, and these diseases are responsible for approximately 17 per cent of blindness in the United States, it is pointed out by Mrs. Eleanor Brown Merrill, Executive Director, National Society for the Prevention of Blindness, in a statement urging widespread public observance of National Social Hygiene Day on February 4. She commented:

"There is a close relationship between prevention of blindness and the drive to stamp out syphilis and gonorrhea. Of the 200,000 blind persons in the United States, about 34,000 lost their sight as the result of these diseases.

"With our nation at war, the campaign against venereal disease, which is being carried on so ably by the United States Public Health Service and the American Social Hygiene Association, is more important than ever. This is now a matter of patriotism as well as humanitarianism and good economics.

"During this period, when victory depends on the speeding up of our industrial production, there is the danger of an increase in accidents among workmen in factories, shops and mills; and the eye hazards of industry, especially, are greater when workers are suffering from syphilis. The presence of this disease increases the severity of an eye injury; a little cut or bruise of the cornea, that would otherwise pass unnoticed, may develop into a serious condition if the worker has syphilis.

"To keep America strong we must take advantage of the scientific advances that can help us control venereal disease and safeguard eyesight."

Eye Injuries During Aid Raids in Great Britain.—A report in the April, 1941, issue of the *British Journal of Ophthalmology* on "Eye Injuries in Aid Raids," has become of special concern to us in the United States with our advent into the war. The facts discussed are significant, not only to those volunteering for civilian defense activities, but to every citizen living in locations which might be affected by air raids. The *Journal* reports that during one night in which there were intensive air raids, at one large hospital in London there were 280 corneal and conjunctival foreign bodies cases among members of the fire services between midnight and 5:30 A.M. Most of these foreign bodies were charred material. Most had been treated at first-aid stations by the instillation of castor oil drops and returned to their duties, but later had to be referred to the hospital. It was found that the pad which was put on after treatment at the hospital was not kept on; therefore, this was discontinued.

Eye injuries caused by flying glass have been very common. Glasses with shatterproof lenses are recommended for those in the less active air raid duties. As the writer comments that, the greater the strain under which people work the less they are willing to

adopt devices for ocular protection, this apparently is the reason why goggles are not recommended for those in the active air raid services. The pasting of windows with net or their occlusion with wooden shutters is recommended for the protection of those sheltering in houses.

Apropos of the danger to the individual not exerting the utmost safety precautions, Lord Beaverbrook recently told the House of Lords about a noted scientist who pursued his work very diligently. During a heavy raid on London he got out of bed and remained the whole time at a window watching to see what might be the effects of the exploding bombs. Unfortunately, one of the explosions resulted in the loss of his eyesight, although there is some possibility of its being restored.

New Fellowships in Nutrition.—With the growing interest in the effect of diet on eye health, as well as general health, the announcement by Swift and Company of the establishment of a series of fellowships for research in nutrition is of especial interest. Intended to aid the federal government in its long-range national nutrition program, the fellowships provide for special research to be undertaken in laboratories of universities and medical schools with funds which the company has set aside as grants in aid. Any fundamental study of the nutritive properties of foods or the application of such information to the improvement of the American diet and health will be eligible for consideration for a grant. Each fellowship will be for one year, unless renewed, and will be granted in an amount proportionate with the scope of the project.

Correction Re Testing for Color Blindness.—The last issue of the REVIEW carried a News Note stating that the U. S. Army has discarded both the Ishihara and Stilling charts for testing color blindness. Major L. L. Gardner, Medical Corps, Assistant, of the Office of the Surgeon General, has written us: "May I advise you that the above information is not entirely correct? Whereas the Holmgren yarn test is used to reveal the subject's ability to recognize differences in clearly defined shades of colors, it has not supplanted the pseudo-isochromatic color plates for more precise determinations. These latter materials continue to be items of Medical Department issue and are widely used in the testing of color vision."

Book Reviews

Eye Hazards in Industry. Louis Resnick. New York: Published for the National Society for the Prevention of Blindness by Columbia University Press, 1941. 321 p.

Impressive and most convincing are the reasons given by the late Louis Resnick for his book on eye hazards in industry.

At the end of every eight-hour work day, 1,000 men and women in American factories and other workplaces will have suffered eye injuries: their eyes pierced, ripped, and crushed by flying fragments; burned by acids, caustics, white-hot molten metal, and the rays of the welding torch; or dimmed by exposure to poisonous substances.

At the end of a year, 300,000 eye injuries occur in our national industries. The cost is more than $100,000,000. The effect of lost production hours on both normal and defense production is of staggering proportions. The stark tragedy of the blind is indescribable; and finally, *the great majority of these eye injuries are preventable.*

There, in a nutshell, are the author's reasons for his excellent and timely volume.

Quite properly, he states the problem in Part I before dealing with its solution, and in so doing provides an amazingly comprehensive array of factual data that are valuable and necessary in approaching the major objective of eye conservation.

The frequency and cost of industrial eye injuries are treated extensively. The text shows where and how these injuries occur. Traumatic injury, eye diseases, defective vision, illumination, and first aid are covered in ample detail.

A most interesting feature is the author's treatment of the insufficiently recognized hazard to eyes that arises from the exposure of persons to industrial poisons. Indeed, the complacent individual who believes that eyes need only to be protected against flying materials and flashes should prepare for a shock when reading the author's material on sources and causes of injury.

Of greatest value are the chapters on mechanical guards, process revision, proper lighting, education, and administrative supervision, in Part II. Here will be found the solution to the common problems and, in fact, many of the uncommon problems that are created

by industrial eye accidents and injuries. The employer and his managerial and supervisory staffs, the safety engineer, instructor, or student, and the interested individual workman will profit by reading this section.

One is impressed not only by the straightforward, able and practical manner in which the entire subject is considered, but also by the very evident sincerity of purpose of the author. Consistently he sticks to his text, notwithstanding the temptation to wander into the field of general accident prevention. Nor does he permit the element of commercialism to color the text in any way.

The book is replete with tables, lists, examples, and illustrations. Appendix II lists industrial poisons which are hazardous to the eyes, also symptoms, conditions and diseases, and types of workman exposed. Recommended illumination standards are listed in detail in Appendix III.

Especially thorough is the treatment of mechanical guarding and process revision on which the author pins his faith as unequalled means, for the present at least, of preventing injuries to the eye.

The reader is left aghast at the magnitude of the problem created by industrial eye hazards, amazed at the wealth of information available for its solution, convinced of the need for more effective action, inspired and enthused.

Eye Hazards in Industry is a timely aid to the current drive on production for national defense. It should serve further to prevent the unnecessary wastage of both the human and material resources of the nation in periods of normal industry as well as in emergencies.

Its arrangement is well suited to textbook and reference purposes and is of especial value to those persons who have the responsibility for initiating and directing the work of protecting the workmen of industry against accidental injury.

—H. W. Heinrich

A TEXTBOOK OF OPHTHALMOLOGY. Sanford R. Gifford, M.D. Second Edition. Philadelphia: W. B. Saunders Company, 1941. 470 p.

This textbook serves well the purpose for which it was written, namely, to instruct the medical student and the general practitioner in the fundamental aspects of ophthalmology. The first edition was fine, but the second edition, with its revisions in modern therapeutics, such as the use of sulfanilamide, heparin, thiamin chloride, etc., in eye conditions, brings to the general medical world a book that is up-to-date, not only in the medical aspects of ocular disease, but also in the treatment of such conditions.

There are numerous plates, both colored and black and white, which illustrate the written text. These are well done.

Dr. Gifford's judgment is well seasoned by his vast experience as a clinician, teacher, and research worker.

—GEORGIANA D. THEOBALD, M.D.

SAFETY EDUCATION. Eighteenth Yearbook of the American Association of School Administrators. Washington, D. C.: National Education Association, 1940. 544 p. ill.

The fact that the American Association of School Administrators has published a yearbook on safety education is significant. There was one other presentation by a national education group; it was made in 1926 by the National Society for the Study of Education. Study by the school administrators indicates that the newcomer, safety education, has been accepted by the leaders in education as a part of the education program.

Safety Education was prepared by a commission composed of nine men. Two members have been identified with the safety movement. The other seven members are from various school systems, some of which have made contributions to the safety movement by the intensive programs of their cities. All are capable executives. The committee represents a range of experience, although the actual contact with safety education could be considered limited in some instances.

The first two chapters are general in nature. They set the guideposts for safety education by stating clearly the philosophy of safety education. They are well written. They impress the reader

with the school's responsibility in preparing young persons to live with reasonable safety in the modern world. Young persons are to be taught safety so that they may enjoy life more fully. In giving youngsters this safety program, the schools are developing character and personality as by-products.

Four chapters are given to a consideration of safety education in elementary and secondary schools. The responsibility of the school is fully outlined. Careful planning and adequate leadership are stressed.

The chapter on secondary schools delineates the need for a general safety education program at this level. It states that, for the most part, safety education in secondary schools is at the experimental stage.

The suggestions given to the discussion of school safety (two chapters) are good. Data regarding school accidents are cleverly given in pictorial graphs. The gymnasium is evidently the most dangerous place, but no explanation is given.

The chapter dealing with safe school buildings is helpful, but is limited for space. This topic might well be selected for further study by this group. School procedure for safety, *i. e.*, the best use of equipment, should be closely related, but receives no attention.

The chapter, "Co-ordination of Safety Programs," is good in that it recognizes that the school program is only one phase in the education of children. If child life is to be safe, many agencies must cooperate. It is well for the schools and the community as a whole to keep this viewpoint.

The Appendix gives a good list of free and low cost materials. A clear explanation of the Standard Accident Reporting System is given.

This book should stimulate school administrators to evaluate safety education programs in the systems for which they are responsible. While traffic safety has received undue emphasis in this book, it must be admitted that there is more available material on traffic safety than any other type. Perhaps one woman on the committee would have been desirable!

—MARY MAY WYMAN

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

364. Sight-Saving, A Co-operative Movement, Ben A. Sylla. 8 p. 5 cts. A school superintendent discusses the organization, administration, and instructional program of a sight-saving class. Reprinted from the *Sight-Saving Class Exchange,* No. 78, November, 1941.

365. Sight Conservation on the Advancing Fronts of Public Health and Nutrition, Frank G. Boudreau, M.D. 12 p. 10 cts. Discusses advances in public health and the effect on prevention of blindness.

366. Eye Defects Discovered Through Selective Service Examinations, Arno E. Town, M.D. 8 p. 5 cts. Discussion and analysis of defects found, and suggestions for their remediation.

367. Saving Sight in the Young Adult Through Social Service, Ophelia Settle Egypt. 12 p. 10 cts. Indicates how the various social services contribute to the solution of the general problem of conservation of sight.

368. Prenatal Factors as Causes of Blindness, Leona Baumgartner, M.D. 16 p. 10 cts. Discusses prevalence of blindness associated with pregnancy and birth, and prenatal conditions affecting the eyesight of the offspring.

369. Heredity in Relation to Blindness and Its Prevention, Morton D. Schweitzer. 4 p. ($1.60 per C; $14.00 per M.) Describes some of the hereditary diseases which are known to lead to serious impairment of vision.

370. Chronic Glaucoma, C. Gregory Barer, M.D. 12 p. 5 cts. Discusses incidence, symptoms and signs, methods of detecting and treatment of glaucoma. Prepared for the general practitioner.

371. The Eye in Aviation, Dorf Bean, M.D. 8 p. 5 cts. Describes the different steps in the eye examination for pilots and cites the visual requirements for other fliers.

372. Nutrition and Sight, Helga Frandsen. 8 p. 5 cts. Presents the effect of vitamin deficiency on eyesight.

D149. The General Practitioner's Part in the Campaign for the Prevention of Blindness from Glaucoma, Mark J. Schoenberg, M.D. 4 p. ($1.00 per C; $7.50 per M.) Reprinted from the *New York State Journal of Medicine,* November 15, 1941.

D150. Meeting the Needs of Atypical Children, Doris D. Klaussen and Georgia Rothberg, R.N. 6 p. ($1.75 per C; $15.00 per M.) Description of the work at the Ann J. Kellogg School. Reprinted from *Public Health Nursing,* September, 1941.

D151. Glaucoma Survey, Derrick Vail, M.D. 1 p. Editorial describing the scope of the Society's glaucoma committee. Reprinted from the *American Journal of Ophthalmology,* October, 1941.

Contributors to This Issue

Iago Galdston, M.D., is the executive secretary of the Medical Information Bureau of the New York Academy of Medicine, New York, N. Y.

Frank G. Boudreau, M.D., is the executive director of the Milbank Memorial Fund, New York, N. Y.

Arno E. Town, M.D., is a practising ophthalmologist in New York City and serves on the staffs of Bellevue and Welfare Hospitals.

Mrs. Ophelia Settle Egypt is an instructor at the Social Work School of Howard University, Washington, D. C.

Leona Baumgartner, M.D., is the acting director of the Bureau of Child Hygiene, Department of Health, New York, N. Y.

Morton D. Schweitzer, New York, N. Y., is a research worker in genetics who is writing a book on this general subject.

Book reviewers: **H. W. Heinrich,** of the Travelers Insurance Company, Hartford, Connecticut, is the author of *Industrial Accident Prevention—a Scientific Approach;* **Georgiana D. Theobald, M.D.,** Oak Park, Illinois, is a member of the Advisory Committee of the National Society, and is on the staff of the Illinois Eye and Ear Infirmary; **Mary May Wyman** is director of health and safety education for the Louisville, Kentucky, public schools.

Index—Sight-Saving Review

Volume XI: 1941

The Sight-Saving Review

Volume XI Number 1

March, 1941

Table of Contents

The Sight-Saving Review

Volume XI Number 2

June, 1941

Table of Contents

The Sight-Saving Review

Volume XI Number 3

September, 1941

Table of Contents

The Sight-Saving Review

Volume XI Number 4

December, 1941

Table of Contents